

**REGION II RST 2 HEALTH AND SAFETY PLAN  
EMERGENCY RESPONSE/REMOVAL ASSESSMENT/REMOVAL ACTION  
(Revised 16 March 2011)**

**TDD No.: Not Assigned (ER)**

**Site Name: TCI New York Fire ER**

**Site Address: 39 Falls Industrial Park Road**

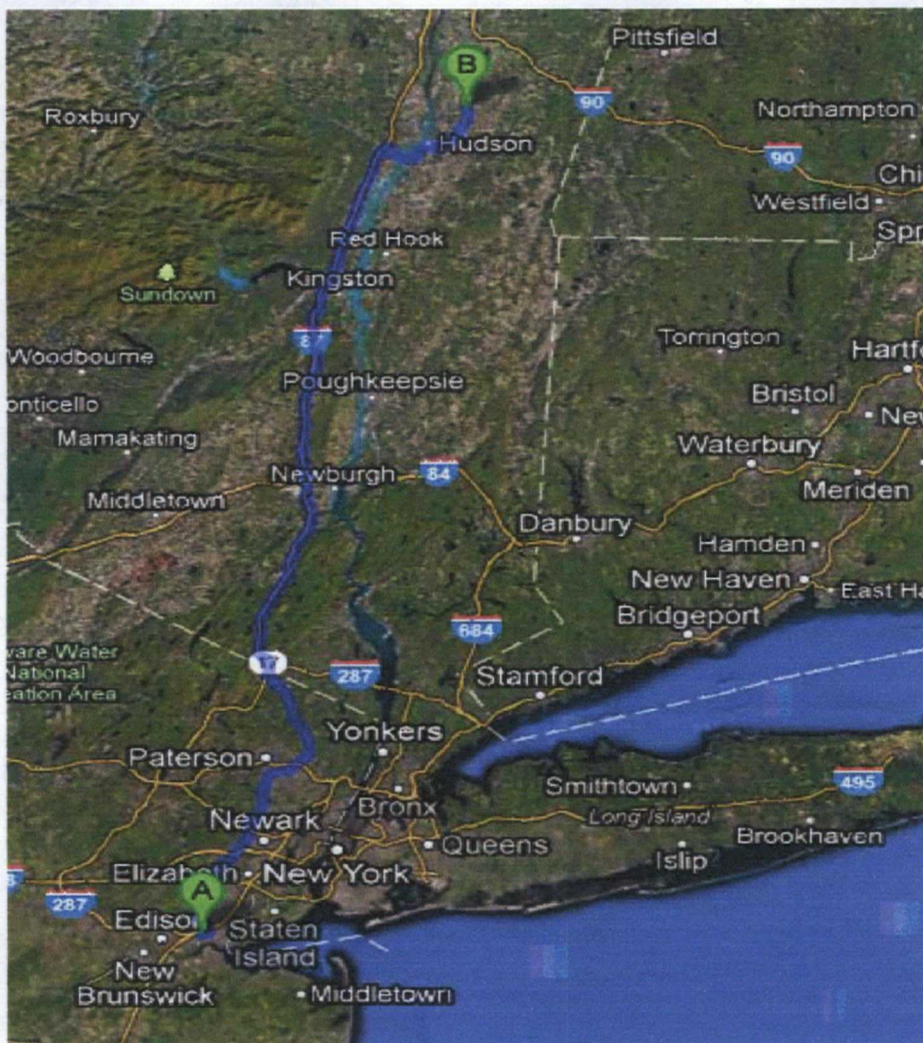
**City: Hudson**

**County/State: Columbia, New York 12534**

- 1. Head east on King Georges Rd/King Georges Post Rd toward New St**
- 2. Slight right onto the ramp to Garden State Pkwy N**
- 3. Keep left at the fork, follow signs for Garden State Pkwy N and merge onto Garden State Pkwy N**
- 4. Take exit 163 N on the left to merge onto NJ-17 N**
- 5. Take the exit toward I-287 N/NJ-17 N**
- 6. Keep left at the fork, follow signs for I-287 N/I-87/NJ-17 N/N Y. Thruway and merge onto I-287 N/NJ-17 N**  
**Entering New York**
- 7. Keep left at the fork, follow signs for I-87 N/NY-17 N/Albany and merge onto I-87 N/NY-17 N**
- 8. Take exit 21 toward NY-23/Catskill/Cairo**
- 9. Continue straight**
- 10. Turn left onto Co Rd 23B/Main St**
- 11. Turn left to merge onto NY-23 E**
- 12. Turn left onto New York 23B E/New York 9G N**
- 13. Turn right onto Columbia St**
- 14. Turn right to stay on Columbia St**
- 15. Continue onto NY-66 N/Union Turnpike**
- 16. Turn left onto New York 9H N**
- 17. Turn left onto Falls Industrial Park Rd**

**Estimated time of Travel: 3 hrs 1 min (149 miles).**





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#### **Historical/Current Site Information:**

On August 2, 2012, at 0230 hours, Weston Solutions, Inc., Removal Support Team (RST 2) got a call from the U.S. Environmental Protection Agency (EPA) REOC to provide support for an Emergency Response occurring at the TCI New York facility located in Hudson, New York. According to the facilities website, the TCI facility provides environmentally safe and proper disposal of oil filled <50 parts per million (ppm) polychlorinated biphenyl (PCB), 50-499ppm and >500ppm PCBs electrical equipment. According to reports, a fire broke out at the facility at approximately 0000 hours on August 2, 2012. The surrounding area has been evacuated and the EPA has requested RST 2 to provide air monitoring and multi-media sampling support.

#### **RST 2 Scope of Work:**

RST 2 was tasked with providing four members to provide perimeter air monitoring and soil and aqueous sampling activities. The facility disposes of PCBs so that contaminants of concern include PCBs, dioxins, and semivolatile organic compounds.



**Three (3) S.M.A.R.T. Health and Safety Goals for the Project (Simple, Measurable, Actionable, Reasonable, & Timely):**

1. Safe navigation (no accidents) while in vehicle during mobilization to the ER.
2. Safe sampling procedures in areas of an ongoing fire.
3. Ensure proper hydration and prevention of heat stress while wearing elevated levels of PPE during the ER.

**Incident Type:**

- ☒ Emergency Response
- ☐ Removal Assessment
- ☐ Removal Action
- ☐ Residential Sampling/Investigation
- ☐ PRP Oversight
- ☐ Other

**Location Class:**

- ☒ Industrial
- ☒ Commercial
- ☒ Urban/Residential
- ☐ Rural

U.S. EPA OSC: David Rosoff

Original HASP: Yes or No Yes

Lead RST 2: Joel Siegel

Date of Initial Site Activities: 08/2/2012

Site Health & Safety Coordinator: Joel Siegel

Site Health & Safety Alternate: Peter Lisichenko

**Response Activities/Dates of Response (fill in as applicable)**

**Emergency Response:**

- ☒ Perimeter Recon – August 2, 2012
- ☒ Site Entry - August 2, 2012
- ☒ Visual Documentation - August 2, 2012
- ☒ Multi-Media Sampling - August 2, 2012
- ☒ Decontamination - August 2, 2012

**Removal Assessment:**

- ☐ Perimeter Recon –
- ☐ Site Entry -
- ☐ Visual Documentation -
- ☐ Multi-Media Sampling –
- ☐ Decontamination –

**Removal Action:**

- ☐ Perimeter Recon -
- ☐ Site Entry -
- ☐ Visual Documentation -
- ☐ Multi-Media Sampling -
- ☐ Decontamination -



### Physical Safety Hazards to Personnel:

<input checked="" type="checkbox"/>	Inclement Weather – Attach FLD02	<input checked="" type="checkbox"/>	Heat – Attach FLD05	<input type="checkbox"/>	Cold – Attach FLD06 Especially for team members who remain in the stream channel.
<input type="checkbox"/>	Confined Space – Attach FLD08	<input type="checkbox"/>	Industrial Trucks – Attach FLD09	<input type="checkbox"/>	Manual Lifting – Attach FLD10
<input checked="" type="checkbox"/>	Terrain – Attach FLD11	<input checked="" type="checkbox"/>	Structural Integrity – Attach FLD13	<input type="checkbox"/>	Site Security – Attach FLD14
<input type="checkbox"/>	Pressurized Containers, Systems – Attach FLD16	<input type="checkbox"/>	Use of Boats – Attach FLD18	<input type="checkbox"/>	Waterways – Attach FLD19
<input type="checkbox"/>	Explosives – Attach FLD21	<input type="checkbox"/>	Heavy Equipment – Attach FLD22	<input type="checkbox"/>	Aerial Lifts and Manlifts – Attach FLD24
<input type="checkbox"/>	Elevated Surfaces and Fall Protection – Attach FLD25	<input type="checkbox"/>	Ladders – Attach FLD26	<input type="checkbox"/>	Excavations/Trenching – Attach FLD28
<input checked="" type="checkbox"/>	Fire Prevention – Attach FLD31	<input type="checkbox"/>	Demolition – Attach FLD33	<input type="checkbox"/>	Underground/Overhead Utilities – Attach FLD34
<input type="checkbox"/>	Hand and Power Tools – Attach FLD38	<input checked="" type="checkbox"/>	Illumination – Attach FLD39	<input checked="" type="checkbox"/>	Storage Tanks – Attach FLD40
<input type="checkbox"/>	Lead Exposure – Attach FLD46	<input checked="" type="checkbox"/>	Sample Storage – Attach FLD49	<input type="checkbox"/>	Cadmium Exposure – Attach FLD50
<input type="checkbox"/>	Asbestos Exposure – Attach FLD52	<input type="checkbox"/>	Hexavalent Chromium Exposure – Attach FLD 53	<input type="checkbox"/>	Benzene Exposure – Attach FLD 54
<input type="checkbox"/>	Drilling Safety – Attach FLD56	<input checked="" type="checkbox"/>	Drum Handling – Attach FLD58	<input type="checkbox"/>	Gasoline Contaminant Exposure – Attach FLD61
<input type="checkbox"/>	Noise – Attach CECHSP, Section 7	<input checked="" type="checkbox"/>	Walking/Working Surfaces	<input type="checkbox"/>	Oxygen Deficiency
<input checked="" type="checkbox"/>	Unknowns in Tanks or Drums	<input type="checkbox"/>	Nonionizing Radiation	<input type="checkbox"/>	Ionizing Radiation

### Biological Hazards to Personnel:

- |   |  |
|---|--|
| <input type="checkbox"/> Infectious/Medical/Hospital Waste – Attach FLD 44 and 45 | <input checked="" type="checkbox"/> Non-domesticated Animals – Attach RST 2 FLD43A     |
| <input checked="" type="checkbox"/> Insects – Attach RST 2 FLD 43B                | <input checked="" type="checkbox"/> Poisonous Plants/Vegetation – Attach RST 2 FLD 43D |
| <input type="checkbox"/> Raw Sewage   | <input type="checkbox"/> Bloodborne Pathogens – Attach FLD 44 and 45                   |



### Training Requirements:

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> 40-Hour HAZWOPER Training with three days supervised experience | <input type="checkbox"/> 8-Hour Management or Supervisor Training in addition to basic training course |
| <input checked="" type="checkbox"/> 8-Hour Annual Refresher Health and Safety Training              | <input type="checkbox"/> Site Specific Health and Safety Training                                      |
| <input type="checkbox"/> DOT (CMV Training - ERV in Use)  | <input type="checkbox"/> Bio-Medical Collection and Response   |

### Medical Surveillance Requirements:

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Baseline initial physical examination with physician certification | <input checked="" type="checkbox"/> Annual medical examination with physician certification |
| <input type="checkbox"/> Site-specific medical monitoring protocol (Radiation, Heavy Metals)           | <input type="checkbox"/> Asbestos worker medical protocol                                   |

### Vehicle Use Assessment and Selection:

Driving is one of the most hazardous and frequent activities for Weston Employees. As such, Weston Employees are required to adhere to established safe operating practices in order to maintain their eligibility to drive Weston owned, leased, or rented vehicles. Every person riding in a Weston vehicle, including passengers must maintain a commitment for a safe journey. This means being attentive while in the vehicle and helping the driver to notice hazards ahead of and around the vehicle and ensure that their presence does not distract the driver from safely operating the vehicle.

A high percentage of vehicle accidents occur when operating in reverse. Anytime a vehicle is operated in reverse, e.g., backing out of a parking area, if there are passengers, at least one of them are to assist the driver by acting as a guide person during the reverse movement or during other vehicle operation where it would be prudent to have a guide person(s) participate in the vehicle movement. When practical, the preferred parking method would be to back into the parking area.

At a minimum, each Weston Driver must:

- Possess a current, valid drivers' license
- Current Commercial Motor Vehicle (CMV) card when operating the Emergency Response Vehicle
- Obey posted speed limits and traffic laws
- Wear seat belts at all times while the vehicle is in operation
- Conduct a 360 degree inspection around the vehicle before attempting to drive the vehicle
- Report accidents / incidents immediately and complete a Notice of Incident (NOI)
- Keep vehicles on approved roadways (4WD doesn't guarantee mobility on unapproved surfaces)



All Region II RST 2 personnel are experienced and qualified to drive RST 2 fleet vehicles (Tahoe, Suburbans, Minivan/Cargo Van, and Emergency Response Vehicle). However, in the event that vehicle rental is required, each person must take the time to familiarize themselves with that particular vehicle. This familiarization includes adjustment of the dashboard knobs/controls, mirrors, steering wheel, seats, and a 360 degree external inspection of the vehicle.

1. The following vehicles are anticipated to be used on this project:

- |  |   |
|--|---|
| <input type="checkbox"/> Car   | <input type="checkbox"/> Pickup Truck   |
| <input checked="" type="checkbox"/> Intermediate/Standard SUV<br>(e.g. Chevy Trailblazer, Chevy Tahoe, Ford Explorer, Ford Escape) | <input checked="" type="checkbox"/> Full Size SUV (e.g. Chevy Suburban, Ford Expedition, GMC Yukon) |
| <input type="checkbox"/> Minivan/Cargo Van (e.g. Chevy Uplander, Chevy Express Van)  | <input type="checkbox"/> Box Truck (Size: approx. 12 feet)  |
| <input checked="" type="checkbox"/> Emergency Response Vehicle (ERV)   | <input type="checkbox"/> Other _____  |

2. Are there any on-site considerations that should be noted:

- |  |   |  |                                       |
|--|---|--|---------------------------------------|
| <input checked="" type="checkbox"/> Working/Driving Surfaces | <input checked="" type="checkbox"/> Debris                  | <input type="checkbox"/> Overhead Clearance              | <input type="checkbox"/> Obstructions |
| <input checked="" type="checkbox"/> Tire Puncture Hazards    | <input type="checkbox"/> Vegetation                         | <input checked="" type="checkbox"/> Terrain              | <input type="checkbox"/> Parking      |
| <input type="checkbox"/> Congestion                          | <input checked="" type="checkbox"/> Site Entry/Exit Hazards | <input checked="" type="checkbox"/> Local Traffic Volume | <input type="checkbox"/> Security     |
| Heavy Equipment  | <input checked="" type="checkbox"/> Time/Length of Work Day | <input type="checkbox"/> Other:                          |                                       |

Do any of the considerations above require further explanation: Will be heavy traffic during long work day commutes. Extra precaution should be used and use of spotters.

3. Was the WESTON Environmental Risk Management Tool completed in EHS? Yes

Was an Environmental Compliance Plan required? No

4. Are there any seasonal considerations that should be noted (e.g., Anticipated Snowy Conditions):  
No

5. Is a Traffic Control Plan required? ☐ Yes ☒ No

The signatures below indicate that the individuals have read and understood this Health and Safety Plan.

PRINTED NAME	SIGNATURE	AFFILIATION	DATE
Joe Sigel	[Signature]	Weston RST	8/2/12
Mark Conover	[Signature]	Weston RST	8-2-12
Mike Salecki	[Signature]	USEPA R2	8/2/12
Margaret A. Forman	[Signature]	USEPA R2	8/2/12
Steven A. C'Brien	[Signature]	Weston RST	8/2/12

**Post-Response Approval**

Final Submission of HASP by:		Date:
Post Response Approval by:		Date:
RST 2 HSO Review by:	Timothy Benton	Date: 8/2/2012



### Air Monitoring Summary Log

Date: \_\_/\_\_/\_\_

Data Collected by: \_\_\_\_\_

Station/Location	CGI / O <sub>2</sub> Meter / CL <sub>2</sub> / H <sub>2</sub> S	Radiation Meter	PID	FID / TVA-1000	Other (_____)

## Chemical Hazards to Personnel

Physical Parameters	Chemical Contaminant Dioxin CAS # 1746-01-6	Chemical Contaminant Polychlorinated biphenyls (PCBs – Aroclor 1254)
Exposure Limits /	_____ ppm 0 mg/m <sup>3</sup> PEL	_____ ppm 0.5 mg/m <sup>3</sup> PEL
	_____ ppm _____ mg/m <sup>3</sup> TLV / REL	_____ ppm 0.001 mg/m <sup>3</sup> TLV / REL
IDLH Level	_____ ppm _____ mg/m <sup>3</sup> IDLH	_____ ppm 5 mg/m <sup>3</sup> IDLH
Physical Form (Solid/Liquid/Gas)	_____ X _____ Solid _____ Liquid	_____ Solid _____ Viscous, oily _____ Liquid
Color	_____ Gas	_____ Gas
	Colorless to white, crystalline solid. Color	Colorless to pale yellow _____ Color
Odor		Mild hydrocarbon odor
Flash Point	_____ NA _____ Degrees F or C	_____ N/A _____ Degrees F or C
Flammable Limits	_____ NA _____ % UEL _____ NA _____ % LEL	_____ N/A _____ % UEL _____ N/A _____ % LEL
Specific Gravity	_____ NA _____ Water = 1	_____ 1.38 _____ Water = 1
Solubility	0.00000002%	Insoluble in water
Incompatible Materials	Halogenated Organic Compounds, Ethers	Strong oxidizers
Routes of Exposure	_____ X _____ Inh _____ X _____ Abs _____ X _____ Con _____ X _____ Ing	_____ x _____ Inh _____ x _____ Abs _____ x _____ Con _____ x _____ Ing
Symptoms of Acute Exposure	Irritation eyes; allergic dermatitis; chloracne; porphyria; gastrointestinal disturbance; possible reproductive, teratogenic effects; in animals: liver, kidney damage; hemorrhage; [potential occupational carcinogen]	Irritation eyes, chloracne; liver damage; reproductive effects [potential occupational carcinogen]
First Aid Treatment	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Ionization Potential	_____ NA _____ eV	_____ N/A _____ eV
Instruments for Detection	_____ PID w/ _____ Probe _____ FID _____ CGI _____ RAD _____ Det Tube _____ Other _____ Lumex	_____ PID w/ _____ Probe _____ FID _____ CGI _____ RAD Det Tube _____ NIOSH 5503 _____ Other _____ Lumex



## Control Measures

Site Map with Work Zones: To be determined on-site. RST 2 has been mobilized to a command post setup outside the immediate area of the fire.



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Exclusion Zone - the area where contamination is either known or expected to occur and the greatest potential for exposure exists. The outer boundary of the Exclusion Zone, called the Hotline, separates the area of contamination from the rest of the site.

Contamination Reduction Zone (CRZ) - the area in which decontamination procedures take place. The purpose of the CRZ is to reduce the possibility that the Support Zone will become contaminated or affected by the site hazards.

Support Zone - the uncontaminated area where workers are unlikely to be exposed to hazardous substances or dangerous conditions. The Support Zone is the appropriate location for the command post, medical station, equipment and supply center, field laboratory, and any other administrative or support functions that are necessary to keep site operations running efficiently.



**Communications:**

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Buddy System  | <input checked="" type="checkbox"/> Radio (cell phone)          |
| <input type="checkbox"/> Air Horn for Emergencies | <input checked="" type="checkbox"/> Hand Signals/Visual Contact |

**Personnel Decontamination Procedures:**

- ☐ None
- ☐ Wet Decontamination (procedures as follows)
- ☒ Dry Decontamination (procedures as follows)
  - Don gloves
  - Hand wipe/brush of sediment
  - Place used PPE in poly trash bag for disposal
  - Remove gloves

**Equipment Decontamination Procedures:**

- ☐ None
- ☒ Wet Decontamination (procedures as follows)
  - Alconox wash and tap water rinse to remove gross contamination
  - Hexane rinse to remove residual organic contamination
  - DI water rinse
  - Nitric acid rinse to remove residual inorganic contamination
  - DI water rinse
  - Air dry
- ☐ Dry Decontamination (procedures as follows)

Adequacy of decontamination determined by: RST 2 On-Site Health and Safety Officer.

**Personal Protective Equipment**

TASK TO BE PERFORMED	ANTICIPATED LEVEL OF PROTECTION	TYPE OF CHEMICAL PROTECTIVE COVERALL	INNER GLOVE / OUTER GLOVE / BOOT COVER	APR CARTRIDGE TYPE or SCBA
Multi-media sampling	Level D/C/B	Saranex/Tyvek	Blue Nitrile/Green Nitrile/Latex Booties	SCBA/P-100 Cartridges
Site Documentation	Level D/C/B	Saranex/Tyvek	Blue Nitrile/Green Nitrile/Latex Booties	SCBA/P-100 Cartridges
Air Monitoring	Level D/C/B	Saranex/Tyvek	Blue Nitrile/Green Nitrile/Latex Booties	SCBA/P-100 Cartridges



### Hazard Task Analysis

RISK LEVEL (High, Medium, Low)	HAZARD	RECOGNITION/ SYMPTOMS	MITIGATION	LEVEL OF PROTECTION
Medium	Slips, Trips, Falls and Uneven Walking Surfaces	Exterior walking surfaces clear of debris, fallen trees, overgrown vegetation and uneven surfaces that may increase the potential for an incident.	Maintain walking paths in cleared areas.	Level D/C/B
Low/Medium	Animals (low), Insects & Hazardous Plants (Medium).	Activities conducted outdoors have the potential for contact with poisonous plants, insects, and snakes in addition to potential contact with other animals.	The SSHO shall review biological hazards native to the site location and Field Operating Procedures (FLD) 43 (et seq.) with all employees and identify those employees with allergies. Use of tyvek coveralls.	Level D/C/B
High	Fire Protection	Activities in the area of the fire should be conducted in a safe manner. Personnel should stay back from the fire until it is put out by the first responders	Stay out of the fire area until extinguished by first responders	Level D/C/B

Frequency and Types of Air Monitoring:

☒ Continuous

☒ Routine - As requested by  
OSC or deemed necessary by  
Site Health and Safety  
Officer.

☒ Periodic -

DIRECT READING INSTRUMENTS	<b>MultiRAE</b> CGI / O <sub>2</sub> / H <sub>2</sub> S / CL <sub>2</sub> / CO / PID	<b>Ludlum 19</b> Micro-R Meter / <b>Ludlum Model</b> <b>3</b> Survey Meter	<b>MicroFID</b> or <b>TVA-1000</b>	<b>Drager</b> Chemical Detector Tube	<b>Particulate</b> <b>Monitors</b>
EQUIPMENT ID NUMBER	TBD	N/A	TBD	N/A	TBD
CALIBRATION DATE		N/A		N/A	
RST 2 PERSONNEL		N/A		N/A	
ACTION LEVEL	<p>≥ 10 - 20% LEL (Confined Space / non- Confined Space)</p> <p>≤ 19.5% O<sub>2</sub> Deficient ≥ 23% O<sub>2</sub> - Enriched</p> <p>H<sub>2</sub>S - PEL: 20 ppm IDLH: 100 ppm</p> <p>Cl<sub>2</sub> - PEL: 1 ppm IDLH: 10 ppm</p>	<p>&lt;3X Background Exercise Caution;</p> <p>≥ 1 mR/HR - Exit Area, Establish Perimeter, Contact RST 2 HSO</p>	<p>Unknowns:</p> <p>1 - 5 Units - "Level C"</p> <p>5-500 Units- "Level B"</p>	<p>PEL / TLV / IDLH: Compare with Drager Tube</p>	TBD



### Emergency Telephone Numbers

Emergency Contact	Location / Address	Telephone Number	Notified
Hospital	<u>Columbia Memorial Hospital</u> 71 Prospect Avenue Hudson, New York	(518) 828-7601	N
Ambulance	911		N
Police	Greenport Police Department	(518) 828-6121 or 911	N
Fire Department	West Ghent Volunteer Fire Department	(518) 828-6478 or 911	N

Chemical Trauma Capability? ☒ Yes ☐ No

If no, closest backup: \_\_\_\_\_ Phone: \_\_\_\_\_

Directions to Hospital (Attach Color Map Following This Page):

1. Head east on **Falls Industrial Park Rd** toward **New York 9H S**
  2. Turn right onto **New York 9H S**
  3. Turn right onto **NY-66 S/Union Turnpike**
  4. Continue onto **Columbia St**
  5. Slight left onto **Prospect Ave**
- Destination will be on the left

**Total Distance/Time: 8.5 mi/16 Minutes**





\*\*This map is subject to Google's Terms of Service, and Google is the owner of rights therein.

Route verified by: \_\_\_\_\_ Date: \_\_/\_\_/\_\_



### Additional Emergency Telephone Contacts

<b>WESTON Medical Emergency Service</b> Dr. Peter Greaney, Medical Director WorkCare 300 South Harbor Blvd, Suite 600 Anaheim, California 92805	800-455-6155 Regular Business Hours (9AM to 7:30PM) <b>Dial 0 or Ext. 175 for Michelle Bui to request the on-call clinician.</b> 800-455-6155 After Hours (Weekdays 7:31PM to 8:59AM, Weekends, Holidays) <b>Dial 3 to reach the after-hours answering service. Request that the service connect you with the on-call clinician or the on-call clinician will return your call within 30 minutes.</b>
Chemtrec	800-424-9300
ATSDR	404-639-0615
ATF (explosives information)	800-424-9555
National Response Center	800-424-8802
National Poison Control Center	800-764-7661
<b>Chemtel</b>	800-255-3924
DOT	800-424-8802
CDC	800-232-0124

#### Pre-Response Approval

HASP prepared by: Timothy Benton

Date: 8/2/2012

Pre-Response/Entry Approval by: Timothy Benton

Date: 8/2/2012

Tasks Conducted	Level of Protection/Specific PPE Used
Multi-media Sampling	Level D/C/B
Site Documentation	Level D/C/B
Air Monitoring	Level D/C/B



### **Hazardous Waste Site and Environmental Sampling Activities**

Off Site:    ☒ Yes    ☐ No

On Site:    ☒ Yes    ☐ No

Describe types off samples and methods used to obtain samples:

RST 2 has been tasked with providing four members to provide perimeter air monitoring and soil and aqueous sampling activities. Sampling procedures will be determined on-site after Site conditions are determined.

Was laboratory notified of potential hazard level of samples?    ☒ Yes    ☐ No

Note: The nature of the work assignment may require the use of the following procedures/programs which will be included as attachments to this HASP as applicable: Emergency Response Plan, Confined Space entry Procedures, Spill Containment Program.

Disclaimer: This Health and Safety Plan (HASP) was prepared for work to be conducted under the Removal Support Team 2 (RST 2) Contract EP-W-06-072. Use of this HASP by WESTON and its subcontractors is intended to fulfill the OSHA requirements found in 29 CFR 1910.120. Items not specifically covered in this HASP are included by reference to 29 CFR 1910 and 1926.



**ATTACHMENT A:**  
**NIOSH POCKET GUIDES**



Centers for Disease Control and Prevention

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## Search the Pocket Guide

SEARCH

Enter search terms separated by spaces.

## 2,3,7,8-Tetrachloro-dibenzo-p-dioxin

**Synonyms & Trade Names** Dioxin; Dioxine; TCDBD; TCDD; 2,3,7,8-TCDD [Note: Formed during past production of 2,4,5-trichlorophenol, 2,4,5-T & 2(2,4,5-trichlorophenoxy)propionic acid.]

CAS No. 1746-01-6	RTECS No. <a href="#">HP3500000</a> ( <a href="#">/niosh-rtecs/HP3567E0.html</a> )	DOT ID & Guide
Formula $C_{12}H_4Cl_4O_2$	Conversion	IDLH Ca [N.D.] See: <a href="#">IDLH INDEX</a> ( <a href="#">/niosh/idlh/intridl4.html</a> )
<b>Exposure Limits</b> NIOSH REL : Ca <a href="#">See Appendix A (nengapdxa.html)</a> OSHA PEL : none		<b>Measurement Methods</b> None available See: <a href="#">NMAM</a> ( <a href="#">/niosh/docs/2003-154/</a> ) or <a href="#">OSHA Methods</a> <a href="#">(http://www.osha.gov/dts/sltc/methods/index.html)</a> @ <a href="#">(http://www.cdc.gov/Other/disclaimer.html)</a>
<b>Physical Description</b> Colorless to white, crystalline solid. [Note: Exposure may occur through contact at previously contaminated worksites.]		
MW: 322.0	BP: Decomposes	MLT: 581°F
Sol: 0.00000002%	VP(77°F): 0.000002 mmHg	IP: ?
Sp.Gr: ?	FLP: ?	UEL: ?
LEL: ?		
<b>Incompatibilities &amp; Reactivities</b> UV light (decomposes)		
<b>Exposure Routes</b> inhalation, skin absorption, ingestion, skin and/or eye contact		
<b>Symptoms</b> irritation eyes; allergic dermatitis, chloracne; porphyria; gastrointestinal disturbance; possible reproductive, teratogenic effects; in animals: liver, kidney damage; hemorrhage; [potential occupational carcinogen]		
<b>Target Organs</b> Eyes, skin, liver, kidneys, reproductive system		
<b>Cancer Site</b> [in animals: tumors at many sites]		
<b>Personal Protection/Sanitation</b> ( <a href="#">See protection codes (protect.html)</a> ) <b>Skin:</b> Prevent skin contact <b>Eyes:</b> Prevent eye contact <b>Wash skin:</b> When contaminated/Daily <b>Remove:</b> When wet or contaminated <b>Change:</b> Daily <b>Provide:</b> Eyewash, Quick drench		<b>First Aid</b> ( <a href="#">See procedures (firstaid.html)</a> ) <b>Eye:</b> Irrigate immediately <b>Skin:</b> Soap flush immediately <b>Breathing:</b> Respiratory support <b>Swallow:</b> Medical attention immediately
<b>Respirator Recommendations</b>		



## NIOSH

**At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

### Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#). See ICSC CARD: [1467 \(/niosh/ipcsneng/neng1467.html\)](#)

Page last reviewed: April 4, 2011

Page last updated: November 18, 2010

Content source: [National Institute for Occupational Safety and Health \(NIOSH\)](#) Education and Information Division

Centers for Disease Control and Prevention 1600 Clifton Rd. Atlanta, GA 30333, USA

800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov)



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CDC 24/7: Saving Lives. Protecting People.™

## Search the Pocket Guide

SEARCH

Enter search terms separated by spaces.

### Chlorodiphenyl (54% chlorine)

**Synonyms & Trade Names** Aroclor® 1254, PCB, Polychlorinated biphenyl

**CAS No.** 11097-69-1

**RTECS No.** TO1360000  
([/niosh-rtecs/TO14Co80.html](http://niosh-rtecs/TO14Co80.html))

**DOT ID & Guide** 2315 171  
(<http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=171>) ☞  
(<http://www.cdc.gov/Other/disclaimer.html>)

**Formula** C<sub>6</sub>H<sub>3</sub>Cl<sub>2</sub>C<sub>6</sub>H<sub>2</sub>Cl<sub>3</sub>  
(approx)

**Conversion**

**IDLH** Ca [5 mg/m<sup>3</sup>]  
See: IDLH INDEX ([/idlh/intridl4.html](http://idlh/intridl4.html))

#### Exposure Limits

**NIOSH REL** \*: Ca TWA 0.001 mg/m<sup>3</sup> See Appendix A ([nengapdx.html](http://nengapdx.html)) [\*Note: The REL also applies to other PCBs.]

**OSHA PEL** : TWA 0.5 mg/m<sup>3</sup> [skin]

#### Measurement Methods

**NIOSH 5503** ☞ ([/niosh/docs/2003-154/pdfs/5503.pdf](http://niosh/docs/2003-154/pdfs/5503.pdf));  
**OSHA PV2088**  
(<http://www.osha.gov/dts/sltc/methods/partial/t-pv2088-01-8812-ch/t-pv2088-01-8812-ch.html>) ☞  
(<http://www.cdc.gov/Other/disclaimer.html>)  
See: NMAM ([/niosh/docs/2003-154/](http://niosh/docs/2003-154/)) or OSHA Methods  
(<http://www.osha.gov/dts/sltc/methods/index.html>)  
☞ (<http://www.cdc.gov/Other/disclaimer.html>)

**Physical Description** Colorless to pale-yellow, viscous liquid or solid (below 50°F) with a mild, hydrocarbon odor.

**MW:** 326  
(approx)

**BP:** 689-  
734°F

**FRZ:** 50°  
F

**Sol:** Insoluble

**VP:** 0.00006 mmHg

**IP:** ?

**Sp.Gr(77°  
F):** 1.38

**FLP:** NA

**UEL:** NA

**LEL:** NA

**Nonflammable Liquid**, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins.

**Incompatibilities & Reactivities** Strong oxidizers

**Exposure Routes** inhalation, skin absorption, ingestion, skin and/or eye contact

**Symptoms** irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]

**Target Organs** Skin, eyes, liver, reproductive system

**Cancer Site** [in animals: tumors of the pituitary gland & liver, leukemia]



**Personal Protection/Sanitation** ([See protection codes \(protect.html\)](#))**Skin:** Prevent skin contact**Eyes:** Prevent eye contact**Wash skin:** When contaminated**Remove:** When wet or contaminated**Change:** Daily**Provide:** Eyewash, Quick drench**First Aid** ([See procedures \(firstaid.html\)](#))**Eye:** Irrigate immediately**Skin:** Soap wash immediately**Breathing:** Respiratory support**Swallow:** Medical attention immediately**Respirator Recommendations****NIOSH****At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0939](#)([/niosh/ipcsneng/neng0939.html](#)) See MEDICAL TESTS: [0176 \(/niosh/docs/2005-110/nmed0176.html\)](#)

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Content source: [National Institute for Occupational Safety and Health \(NIOSH\)](#) Education and Information DivisionCenters for Disease Control and Prevention 1600 Clifton Rd. Atlanta, GA 30333, USA  
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov)

**ATTACHMENT B:**

**WESTON FLDS**



## **FLD 02 INCLEMENT WEATHER**

Hot weather (ambient temperatures over 70°F), cold weather (ambient temperatures below 40°F), rain, snow, ice, and lightning are examples of inclement weather that may be hazardous or add risk to work activities. Extremes of heat, cold, and humidity, as well as rain, snow, and ice, can adversely affect monitoring instrument response and reliability, respiratory protection performance, and chemical protective clothing materials.

### **RELATED FLDs AND OP**

*FLD 05 – Heat Stress Prevention and Monitoring*

*FLD 06 – Cold Stress*

*OP 05-03-008 – Inclement Weather & Business Disruption Policy*

### **PROCEDURE**

The potential for exacerbating the impact of physical hazards must be considered for tasks that expose personnel to inclement weather. Risk assessment and hazards analysis should be accomplished during the planning stages of a project for the most likely inclement weather conditions that may be encountered, i.e., rain and lightning in late spring, summer, and early fall, or lightning prone areas; cold, snow, and ice in winter. The Field Safety Officer (FSO) must determine the proper safety procedures and recommend them to the site manager. Each worker must evaluate the risk associated with his/her work and be actively alert to these hazards. Managers and workers must be familiar with the requirements of FLD 05 and FLD 06.

A pre-site activity risk assessment must be completed when inclement weather occurs. Weather conditions that affect instruments and personal protective equipment (PPE) function must be conveyed to site workers who should monitor function and integrity of PPE and be alert to changing weather conditions. A decision must be made on the proper safety procedures to use if work must continue, or to stop work if the risk is too great. The appropriate Safety Professional must be notified of all instances of the need to stop work for safety reasons, including inclement weather.

#### **Heat**

Hot, dry weather increases risk of soil drying, erosion, and dust dispersion, which may present or increase risk of exposure and environmental impact from toxic hazards. Hot weather will increase pressure on closed containers and the rate of volatilization, thereby potentially increasing the risk of exposure to toxic, flammable, or explosive atmospheres.

#### **Prevention and Protective Measures**

Employees must be protected from airborne contaminants using engineering controls such as wetting dry soil to prevent particle dispersion, and providing local ventilation to reduce volatile air contaminants to safe levels, or if engineering controls are infeasible, using prescribed PPE. Wind shifts and velocity should be measured where change may result in dispersion of airborne contaminants into the work area.

#### **Rain, Wet Weather, and High Humidity**

Wet conditions resulting from rain and wet weather increase slipping and tripping hazards, braking distances of vehicles, the potential for vehicle skidding, or difficulties in handling powered devices such as augers and drills. Rain fills holes, obscures trip and fall hazards, and increases risk of electrical shock.

when working with electrical equipment. Changes in soil conditions caused by rain can impact trenching and excavating activities, creating the potential for quicksand formation, wall collapse, and cave-in. Vehicles become stuck in mud, and tools and personnel can slip on wet surfaces. Rain and wet conditions may decrease visibility (especially for personnel wearing respiratory protection) and limit the effectiveness of certain direct-reading instruments (e.g., photoionization detectors [PIDs]).

Feet that become wet and are allowed to remain wet can lead to serious problems under both heat and cold conditions. Activities that may result in wet feet include extended work in chemical protective clothing and wading in water/liquid during biological assessments. Trench foot, paddy foot, and immersion foot are terms associated with foot ailments resulting from feet being wet for long periods of time. All have similar symptoms and effects. Initial symptoms include edema (swelling), tingling, itching, and severe pain. These may be followed by more severe symptoms including blistering, death of skin tissue, and ulceration. (NOTE: The following Preventive and Protective Measures also apply to Cold, Snow, and Ice.)

#### Preventive and Protective Measures

Walkways, stairs, ladders, elevated workplaces, and scaffold platforms must be kept free of mud, ice, and snow. Employees shall be prohibited from working on scaffolds covered with snow, ice, or other slippery material except as necessary for removal of such materials.

Vehicles used in rain or cold weather must have working windshield wipers and defrosters, and windows must be kept clear of obstruction.

Drivers must observe traffic laws, including maintaining speed within limits safe for weather conditions, and wearing seat belts at all times. Note that this may mean operating below the posted speed limit.

When walking, workers should use a walking stick or probe to test footing ahead where there is standing water, snow, or ice to protect the walker against stepping into potholes or onto puncture hazards, buried containers, or other potential structurally unsound surfaces.

Prior to using vehicles or equipment in off-road work, workers should walk the work area or intended travelway when puddles or snow may obscure potholes, puncture hazards, or buried containers, or other potential structurally unsound surfaces.

Project managers should arrange to have winches, come-alongs, or other mechanical assistance available when vehicles are used in areas where there is increased risk of getting stuck. Cable or rope and mechanical equipment used for pulling stuck vehicles must be designed for the purpose, of sufficient capacity for the load, and be inspected regularly and before use to ensure safety. **Manually pushing stuck vehicles is to be avoided.**

Prevention methods are required when work is performed in wet conditions or when conditions result in sweating, causing the feet to become and remain wet. Proper hygiene is critical. Workers must dry their feet and change socks regularly to avoid conditions associated with wet feet. Use of foot talc or powder can additionally assist in prevention of this type of condition.

#### **Cold, Snow, and Ice**

Cold weather affects vehicle operation by increasing difficulty in starting and braking. Ice, frost, and snow can accumulate on windows and reduce vision. Cold, wet weather can cause icing of roadways,



driveways, parking areas, general work places, ladders, stairs, and platforms. Ice is not always as obvious to see as snow or rain, and requires special attention, especially when driving or walking.

Snow and ice increase the risk of accidents such as slipping when walking, climbing steps and ladders, or working at elevation, and the risk of accidents when driving vehicles or operating heavy equipment. Heavy snow and ice storms may cause electric lines to sag or break, and the use of electrical equipment in snow increases the risk of electric shock. Snow can hide potholes and mud, which can result in vehicles getting stuck or persons falling when stepping into hidden holes. Snow also may cover water, drums or other containers, sharp metal objects, debris, or other objects that can cause falls or punctures.

#### Preventive and Protective Measures

WESTON personnel are cautioned against operating motor vehicles such as cars or trucks on ice under any circumstances. If traveling in icy conditions, WESTON personnel should follow all public service advisories that curtail driving activities.

Personnel performing activities that require working over ice should be aware of minimal ice thickness safety guidelines as follows:

- 4-inch minimum: activities such as walking or skating.
- 6-inch minimum: activities such as snowmobiling or the use of equipment with the same weight and cross-sectional area as a snowmobile.

Personnel should always be aware that these measurement guidelines are under ideal conditions and that snow cover, conditions on rivers, ponds, or lakes with active currents, and other environmental factors impact the safety of working on ice. Clear ice typically is the strongest, while ice that appears cloudy or honeycombed (contains entrained air) is not as structurally strong. Measurements made by drilling or cutting through the ice should be made every few feet to verify safe conditions. Provisions for rescue (e.g., ladders or long poles and effective communications) must be available at the work site.

#### **Lightning**

Lightning represents a hazard of electrical shock that is increased when working in flat open spaces, elevated work places, or near tall structures or equipment such as stacks, radio towers, and drill rigs. Lightning has caused chemical storage tank fires and grass or forest fires. Static charges associated with nearby electrical storms can increase risk of fire or explosion when working around flammable materials, and can adversely affect monitoring instruments.

Lightning is the most dangerous and frequently encountered weather hazard people experience each year. Lightning affects all regions. Florida, Michigan, Pennsylvania, North Carolina, New York, Ohio, Texas, Tennessee, Georgia, and Colorado have the most lightning deaths and injuries.

#### Preventive and Protective Measures

Prior to working in areas or beginning projects when or where there is an increased potential for lightning striking personnel, steps must be taken to predict the occurrence of lightning strikes. Recommendations include:

- Check with client management to determine if there are any patterns or noted conditions that can help predict lightning or if there are structures that are prone to lightning strikes. Arrange for

client notification when there is increased potential for lightning activities. Ensure that clients include WESTON workers in lightning contingency plans.

- Monitor weather reports.
- Note weather changes and conditions that produce lightning.
- Stop work in open areas, around drill rigs or other structures that may attract lightning, on or in water and in elevated work places when lightning strikes are sighted or thunder is heard near a work site.
- Ensure all personnel are provided with safe areas of refuge. Prevent personnel from standing in open areas, under lone trees, or under drill rigs.
- Observe the "30-30" Rule. If you see lightning and thunder is heard within 30 seconds (approximately 6 miles), seek shelter. If you hear thunder, but did not see the lightning, you can assume that lightning is within 6 miles and you should seek shelter. Remain in the sheltered location for 30 minutes following the last lightning strike.
- Use a hand held static potential meter (lightning detection device) to monitor the potential difference between a cloud and the ground. When the measured potential is greater than 2 kV/m, there is a potential for a lightning strike – seek shelter.

## **High Wind and Tornado Safety**

### **High Winds**

Many construction workers have died due to wind-related accidents and injuries. A ladder that seems secure under normal circumstances can become unstable during windy conditions and cause you to fall. Scaffolding that is improperly secured can rip free during strong winds and kill bystanders. The risk of injury for construction workers increases during strong winds. Keep in mind that changing weather conditions can affect your daily work tasks, and make sure you have a game plan to prevent proper damage and personal injury.

**Stay Informed:** With today's modern technology available at the touch of a button, you should keep up to date with the latest local weather reports. Visit [weatherbug.com](http://weatherbug.com) or [weather.gov](http://weather.gov) to stay informed in case of wind warnings, watches, and advisories. Larger projects may have their own weather station on site to provide instant weather data. Use daily hazard assessments to determine if working conditions have changed or will change throughout the day.

**Be Prepared:** When you know the weather will be windy, secure loose building materials, scaffolding and fencing that could be picked up or torn loose by strong winds and thrown onto surrounding streets, structures, vehicles, or bystanders.

**Know the Limits of Your Equipment:** When operating any equipment, take time to read the operator's manual and become familiar with the wind specifications. Many crane manufacturers have high-wind guidelines to prevent you from operating a crane in unsafe weather. You should also check safety equipment such as fall protection to determine if it is adequate for windy conditions.



## Know the Terminology

### Severe Thunderstorm Watch

A Severe Thunderstorm Watch means that strong thunderstorms capable of producing winds of 58 mph or higher and/or hail 3/4 inches in diameter or larger are possible. If you are in the area of a Severe Thunderstorm Watch, you should be prepared to take shelter from thunderstorms. Severe Thunderstorm Watches are generally issued for 6-hour periods.

### Severe Thunderstorm Warning

A Severe Thunderstorm Warning means that thunderstorms capable of strong winds and/or large hail are occurring or could form at any time. If you are in the area of a severe thunderstorm, you should take shelter indoors immediately, avoid windows, and be prepared for high winds and hail. Severe Thunderstorm Warnings are generally in effect for an hour or less.

### High Wind Watch

A High Wind Watch is issued when sustained winds exceeding 40 mph and/or frequent gusts over 60 mph are likely to develop in the next 24 to 48 hours. For summit areas, high wind watches are issued when sustained winds are expected to exceed 45 mph and/or frequently gust over 60 mph. If you are in an area for which a High Wind Watch has been issued you should secure loose objects outdoors that may blow about and avoid outdoor activity that exposes you to high winds.

### High Wind Warning

A High Wind Warning is issued when sustained winds exceeding 40 mph and/or frequent gusts over 60 mph are occurring or imminent. For summit areas, warnings are issued for winds exceeding 45 mph and/or frequently gusting over 60 mph. Wind warnings may issued up to 24 hours ahead of the onset of high winds and remain in effect for 6 to 12 hours. If you are in an area where a high wind warning is in effect you should avoid activities that expose you to high winds. Loose objects may be blown around. Tree limbs may break and fall. Power lines may be blown down.

### Wind Advisory

A Wind Advisory is issued when sustained winds of 30 to 39 mph and/or frequent gusts to 50 mph or greater are occurring or imminent. Wind advisories may be in effect for 6 to 12 hours. If you are in an area where a wind advisory is in effect you should secure loose objects that may be blown about outdoors and limit activity that may expose you to high winds.

Work Safely: If you will be working on a windy day, you should be alert and protected. Wear eye protection to prevent dust and other particles from entering or striking your eyes. Keep your hard hat on at all times to prevent injuries from falling or flying objects. The likelihood of falls from heights is greatly increased by strong winds. Wear the necessary PPE to ensure your safety.

### To avoid flying debris and to minimize damage during high winds:

- Shut down outdoor activities involving work at elevation on ladders, scaffolding, aerial lifts, etc., handling large tarps and plastic sheeting when wind speeds exceed 25 mph; including work with radioactive materials and highly toxic materials that could be dispersed by the winds.
- At 13 - 18 mph wind will raise dust. Follow the dust action level.

- Move mobile items stored outside to indoor storage.
- Secure any items that cannot be moved inside.
- Be careful opening exterior doors.
- Be cautious about downed power lines, tree limbs, and debris on roads.
- Be alert for animals who have escaped from farms and zoos.

**Stay Away from Power Lines:** High winds can cause tree limbs to fall on power lines resulting in electrocution hazards or loss of power. Your best bet is to keep your distance.

## **Tornados**

### **What is a TORNADO?**

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. It is spawned by a thunderstorm or as a result of severe weather associated with hurricanes. A funnel cloud is formed as cool air overrides a layer of warm air, forcing the warm air to rise rapidly. The damage from a tornado results from high wind velocity and wind blown debris.

### **Tornado Safety**

When a tornado approaches, you have only a brief amount of time to make life-or-death decisions. Advance planning and quick response are the keys to surviving a tornado.

**Purchase a NOAA Weather Alert radio with an alert feature.** When tuned to the proper frequency, these weather radios remain silent until a weather emergency occurs. Once they pick up the alarm tone, they will begin broadcasting emergency weather information so that citizens can protect themselves and their property. Some models of the NOAA weather radio incorporate the Specific Area Message Encoder technology, allowing users to target only those warnings that affect their immediate geographic area.

**Conduct tornado drills.** Designate an area to serve as your safe area, and practice having team members assemble there in response to a mock tornado warning.

**Emergency Communications Plan.** Develop an emergency communications plan in case team members are separated from one another when a tornado warning goes into effect. Designate an emergency coordinator. Instruct everyone to contact this coordinator in a weather emergency for instructions on what to do during the storm and where to reassemble after the emergency has passed. Design contingency plans to be consistent with client contingency plans. When possible use client warning and alerting systems and confirm that team members have access to shelters and know how to get to them.

### **Know the Difference between a Tornado Watch and a Tornado Warning**

**Tornado Watch:** Issued by the National Weather Service when tornadoes are possible in your area. You should remain alert for approaching storms. Remind family members of where the safe areas are within your home, and carefully monitor radio or television reports for further developments.

**Tornado Warning:** Indicates that a tornado has been sighted in your area, or is indicated on weather radar. You should proceed to safe shelter immediately.



*When A Tornado Warning Goes In Effect, Put Your Safety Plans In Action.*

**In Your Automobile:** Motor vehicles are easily overturned by tornado winds. Leave your vehicle and seek shelter in a sturdy building. As a last resort, seek shelter in a ditch or culvert. Do not try to outrun or outmaneuver a tornado! Use the time to seek appropriate shelter outside your vehicle.

**Office Buildings, Hotels, and Shopping Centers:** Take shelter in an interior hallway on a lower floor. A closet, bathroom or other small room with short, stout walls will give some protection from collapse and flying debris. Otherwise, get under heavy furniture and stay away from windows. Many tornado deaths have occurred in large buildings due to the collapse of a roof or wide span wall. A corner area, away from a window, is safer than the middle of a wide span wall.

**Out In Open Country:** When severe weather approaches, seek inside shelter immediately. The chances of encountering falling trees, downed power lines and lightning are far greater than encountering a tornado itself. If a tornado approaches, lie flat in the nearest depression, such as a culvert or ditch, and cover your head with your arms.

**BE ALERT TO CHANGING WEATHER CONDITIONS  
HAVE AN EMERGENCY WEATHER PLAN IN PLACE  
REHEARSE YOUR CONTINGENCY PLANS PERIODICALLY  
KNOW WHERE TO GO WHEN A TORNADO THREATENS.**

## **FLD 05 HEAT STRESS PREVENTION AND MONITORING**

Heat stress may occur at any time work is performed at elevated temperatures. If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur such as fatigue, irritability, anxiety, and decreased concentration or dexterity, and possibly death. Because heat stress is one of the most common and potentially serious illnesses at field sites, regular monitoring and other preventive measures are vital to ensure worker safety. Wearing chemical protective clothing often decreases natural body heat loss (cooling) and increases the risk of heat stress.

Employees who are taking prescription or over-the-counter medications should consult with their personal physician prior to working in high-temperature environments to see if their medication would impair their ability to handle heat stress.

### **REFERENCES**

OSHA 29 CFR 1910 and 1926

### **RELATED FLDs**

*FLD 02 – Inclement Weather*

*FLD 03 – Hot Processes – Steam, Low Temperature Thermal Treatment Unit, and Transportable Incinerator*

*FLD 08 – Confined Space Entry Program*

*FLD 36 – Welding/Cutting/Brazing/Radiography*

*FLD 37 – Pressure Washers/Sandblasting*

### **PROCEDURE**

#### **Heat Stress Symptoms and Treatment**

##### Heat Rash

Heat rash, also known as prickly heat, may occur in hot and humid environments where sweat is not easily removed from the surface of the skin by evaporation and is aggravated by chafing clothes. When extensive or complicated by infection, heat rash can be so uncomfortable that it inhibits sleep and impairs a worker's performance.

Symptoms – Mild red rash, especially in areas of the body that come into contact with protective gear.

Treatment – Decrease amount of time spent working in protective gear and provide body powder to help absorb moisture and decrease chafing. Heat rash can be prevented by showering, resting in a cool place, and allowing the skin to dry.

##### Heat Cramps

Heat cramps are caused by inadequate electrolyte intake. The individual may be receiving adequate water; however, if not combined with an adequate supply of electrolytes, the blood can thin to the point where it seeps into the active muscle tissue, causing cramping.

Symptoms – Acute painful spasms of voluntary muscles, most notably the abdomen and extremities.



**Treatment** – Move the victim to a cool area and loosen clothing. Have the victim drink 1 to 2 cups of cool potable water or diluted commercial electrolyte solution (e.g., Gatorade, Quench) immediately, and then every 20 minutes thereafter until symptoms subside. Electrolyte supplements can enhance recovery; however, it is best to double the amount of water required by the dry mix package directions or add water to the liquid form.

### **Heat Exhaustion**

Heat exhaustion is a state of weakness or exhaustion caused by the loss of fluids from the body. Heat exhaustion is not as dangerous as heat stroke, but if not properly managed in the field it may lead to heat stroke.

**Symptoms** – Pale, clammy, and moist skin, profuse perspiring, and extreme weakness. Body temperature is normal, pulse is weak and rapid, and breathing is shallow. The person may have a headache, may vomit, may feel dizzy, and may be irritable or confused.

**Treatment** – Move the victim to a cool, air-conditioned or temperature-controlled area, loosen clothing, place in a position with the head lower than the feet (shock prevention), and allow the victim to rest. Consult a physician. Ensure that the victim is not nauseated or vomiting. If not nauseated or vomiting, give the victim small sips of cool water or diluted electrolyte replenishment solution (one to one dilution with water, or if mixing from powder, double the water added). If this is tolerated, have the victim drink 1 to 2 cups of fluid immediately, and every 20 minutes thereafter until symptoms subside. Seek medical attention at the advice of the consulting physician.

### **Heat Stroke**

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of the body's heat regulating mechanisms, i.e., the individual's temperature control system (sweating) stops working correctly. Body temperature rises so high that brain damage and death may result if the person is not cooled quickly.

**Symptoms** – Red, hot, dry skin (although the person may have been sweating earlier); nausea, dizziness, confusion, extremely high body temperature (i.e., 104°F or greater as measured with an oral thermometer), rapid respiratory and pulse rate, seizures or convulsions, unconsciousness or coma.

**Treatment** – Immediately call for emergency medical assistance. Remove the victim from the source of heat and cool the victim quickly. If the body temperature is not brought down quickly, permanent brain damage or death may result. Remove all PPE and as much personal clothing as decency permits. Fan the person while sponging or spraying with cool or tepid water. Apply ice packs (if available) to the back of the neck, armpits, groin area, or behind the knees. Place the victim flat on their back or with head and shoulders slightly elevated. If conscious, and not nauseated or vomiting, the victim may be provided sips of cool water. Do not give the victim coffee, tea, or alcoholic beverages. Emergency medical personnel will take over treatment when they arrive.

### **Recognition and Risk Assessment**

In the planning stages of a project, the potential for heat stress disorders must be considered as a physical hazard in the site-specific Health and Safety Plan (HASP). Risk assessment can be accomplished in the development stages of a project by listing in the HASP the most likely heat stress disorders that may occur. The Field Safety Officer (FSO) must make decisions on the proper safety procedures and recommend them to the site manager. Each worker must evaluate the risk associated with his or her work and be actively alert to these hazards. Any site worker may stop work if safety procedures are not

followed or the risk is too great. In addition, all site personnel must be aware of these symptoms in both themselves and their co-workers.

### **Prevention and Protection Programs**

Heat stress is affected by several interacting factors including, but not limited to, age, obesity, physical condition, substance abuse, level of personal protective equipment (PPE) worn, and environmental conditions (temperature, shade, and humidity). Site workers must learn to recognize and treat the various forms of heat stress. The following recommendations should be followed to prevent heat stress:

- The most important measure to prevent heat-related illness is adequate fluid intake. Workers should drink 1/2 to 1 quarts of liquids per hour in high heat conditions. Most of this liquid should be water. Under heavy work and heat conditions, the body may lose up to 2 gallons of fluids per day. To prevent heat stress symptoms, the individual must ensure replacement of this fluid.
- Provide disposable cups that hold about 4 ounces, and water that is maintained at 50 to 60°F. Workers should drink 16 ounces of water before beginning work, and a cup or two at each break period.
- Provide a shaded area for rest breaks. Ensure that adequate shelter is available to protect personnel against heat and direct sunlight. When possible, shade the work area.
- Discourage the intake of caffeinated drinks during working hours.
- Monitor for signs of heat stress.
- Encourage workers to maintain a good diet during these periods. In most cases, a balanced diet and lightly salted foods should help maintain the body's electrolyte balance. Bananas are especially good for maintaining the body's potassium level.
- If utilizing commercial electrolyte mixes, double the amount of water called for in the package directions. Indications are that "full-strength" preparations taken under high heat stress conditions may actually decrease the body's electrolytes.
- Acclimate workers to site work conditions by slowly increasing workloads (i.e., do not begin work activities with extremely demanding tasks).
- Rotate shifts of workers who are required to wear impervious clothing in hot weather.
- Encourage workers to wear lightweight, light-colored, loose-fitting clothing.
- In extremely hot weather, conduct field activities in the early morning and evening.
- Provide cooling devices to aid natural body heat regulation. These devices, however, add weight and their use should be balanced against worker efficiency. An example of a cooling aid is long cotton underwear, which acts as a wick to absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing.
- Good hygienic standards must be maintained by frequent showering and changes of clothing.
- Clothing should be permitted to dry during rest periods.
- Whenever working in the sun, provide employees with sunscreen with both UVA and UVB protection.
- Persons who notice skin problems should immediately consult medical personnel.



## Heat Stress Monitoring and Work Cycle Management

When strenuous field activities are part of on-going site work conducted in hot weather, the following guidelines should be used to monitor the body's physiological response to heat, and to manage the work cycle, even if workers are not wearing impervious clothing. These procedures should be instituted when the temperature exceeds 70°F and the tasks/risk analysis indicates an increased risk of heat stress problems. Consult the HASP and a safety professional (e.g., Division EHS Manager, FSO) if questions arise as to the need for specific heat stress monitoring. In all cases, the site personnel must be aware of the signs and symptoms of heat stress and provide adequate rest breaks and proper aid as necessary.

**Measure Heart Rate** – Heart rate should be measured by the radial pulse for 30 seconds as early as possible in the rest period. The heart rate at the beginning of the rest period should not exceed 110 beats per minute. If the heart rate is higher, the next work period should be shortened by 33%, while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%. The procedure is continued until the rate is maintained below 110 beats per minute.

**Measure Body Temperature** – When ambient temperatures are over 90°F, body temperatures should be measured with a clinical thermometer as early as possible in the rest period. If the oral temperature exceeds 99.6°F (or 1 degree change from baseline) at the beginning of the rest period, the following work cycle should be shortened by 33%. The procedure is continued until the body temperature is maintained below 99.6°F (or 1 degree change from baseline). Under no circumstances should a worker be allowed to work if their oral temperature exceeds 100.6°F.

**Measure Body Water Loss** – Body water loss greater than 1.5% of total body weight is indicative of a heat stress condition. Body weight is measured before PPE is donned and after the PPE is removed following a work cycle. Body water loss can be measured with an ordinary bathroom scale; however, the scale must be sensitive to one-half pounds increments. A worker is required to drink additional fluids and rest if their body water loss is greater than 1.5%.

**NOTE:** For purposes of this operating practice, a break is defined as a 15-minute period and/or until an individual's vital signs are within prescribed guidelines.

A physiological monitoring schedule is determined by following the steps below:

- Measure the air temperature with a standard thermometer.
- Estimate the fraction of sunshine by judging what percent the sun is out (refer to Table 1).
- Calculate the adjusted temperature based on the following formula:  
$$\text{Adjusted Temperature} = \text{Actual Temperature} + 13 X \text{ (where } X = \text{sunshine fraction from Table 1)}$$
- Using Table 2, determine the physiological monitoring schedule for fit and acclimated workers for the calculated adjusted temperature.

The length of work period is governed by frequency of physiological monitoring (Table 2). The length of the rest period is governed by physiological parameters (heart rate and oral temperature).

**Table 1. Percent Sunshine Factors  
Heat Stress Prevention and Monitoring**

Percent Sunshine (%)	Cloud Cover	Sunshine fraction
100	No cloud cover	1.0
50	50% cloud cover	0.5
0	Full cloud cover	0.0

**Table 2. Physiological Monitoring Schedule  
Heat Stress Prevention and Monitoring**

Adjusted Temperature	Level D (Permeable clothing)	Level C, B, or A (Nonpermeable clothing)
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°F (30.8° - 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° - 87.5°F (28.1° - 32.2°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° - 82.5°F (25.3° - 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° - 77.5°F (22.5° - 25.3°C)	After each 150 minutes of work	After each 120 minutes of work

**Example:** Site personnel anticipate wearing level C (impermeable clothing) during site activities. The air temperature is 80°F and there are no clouds in the sky (100% sunshine). The adjusted temperature is calculated in the following manner:

$$\text{Adjusted Temperature (Adj T } ^\circ\text{F)} = \text{Actual Temperature (Amb T } ^\circ\text{F)} + (13 \times \text{sunshine fraction})$$

$$\text{Adj T } ^\circ\text{F} = 80^\circ\text{F} + (13 \times 1.0)$$

$$\text{Adj T } ^\circ\text{F} = 93^\circ\text{F}$$

Using Table 2, the pulse rate, oral temperature and body water loss monitoring would be conducted after each 15 minutes of work. The adjusted temperature may need to be redetermined if the percent sunshine and ambient temperature changes drastically during site work.

If an individual's heart rate exceeds 110 beats per minute at the beginning of the rest period, that individual will continue to rest until his or her heart rate drops to baseline; the next work period is then decreased by 33%.

## **FLD 11 ROUGH TERRAIN/ATV USE**

### **RELATED FLDs**

*FLD 02 – Inclement Weather*

*FLD 05 – Heat Stress Prevention and Monitoring*

*FLD 06 – Cold Stress*

*FLD 22 – Heavy Equipment Operation*

*FLD 47 – Clearing, Grubbing, and Logging Operations*

*FLD 57 – Motor Vehicle Safety*

### **HAZARD**

Physical hazards associated with rough terrain include vehicle accidents, heavy equipment incidents, falling, slipping, and tripping.

Driving vehicles on uneven surfaces creates a possibility of the vehicle rolling, getting stuck in mud or ditches, or of an accident due to flat tires or striking obstacles and other vehicles.

When working on foot, steep inclines and heavy or downed vegetation can hide holes or breaks in the terrain, increasing the risk of slips, trips, and falls.

### **RECOGNITION AND RISK ASSESSMENT**

Rough terrain complicates work activities and adds to or increases risk. In the planning stages of a project, rough terrain must be considered as a physical hazard and identified in the site-specific health and safety plan (HASP). Risk assessment is usually accomplished from site history information (i.e., site topography) and on site by the Field Safety Officer (FSO).

### **HAZARD PREVENTION AND PROTECTION PROGRAMS**

#### **Safety on Foot**

Personnel working on rough terrain should maintain a high level of physical conditioning due to increased body stress and exertion.

The site crew should be alert and observe terrain while walking to minimize slips, trips, and falls.

Boots should be ankle high or higher to provide additional support and stability.

Work will be completed in adequate natural light or sufficient illumination will be maintained.

Site personnel will conduct an initial walkover and the “buddy system” will be implemented.

Emergency communications such as a cell phone or two-way radio should be carried at all times.

Personnel should be aware of potential hazards and ensure the availability of first-aid supplies and knowledge of the location of the nearest medical assistance.

#### **VEHICLE SAFETY**

Vehicle drivers and passengers will wear seatbelts at all times.



Hazards can be prevented by ensuring regular maintenance is performed on vehicles and all safety features are working. Have brakes and wheel bearings of vehicles used off road or in four wheel drive inspected at increased frequency (suggest inspections at twice the manufacturer's recommended frequency).

In order to minimize accidents, site surveillance on foot may be required to ensure clear driving paths.

Minimize side hill travel. Travel straight up and down hills whenever possible. Passengers will not be allowed when side hill travel is required.

Take into account loads or superstructure of vehicles which raise the center of gravity and increase risk of tipping.

Cross streams, small logs or other passable (there is adequate clearance of the undercarriage) obstructions at right angles.

Four wheel drive vehicles should be used if terrain conditions are wet, frozen, broken, or otherwise deemed unsafe for two wheel drive vehicles by the FSO. Use of vehicles off-road will be specifically addressed in the HASP and personnel operating vehicles will be checked for proficiency.

- Before moving a vehicle in the field, first walk the route of travel, inspecting for depressions, stumps, gullies, ruts, and similar obstacles.
- Always check the brakes of a vehicle before traveling, particularly on rough, uneven, or hilly ground.
- Check the complete drive train of a carrier at least weekly for loose or damaged bolts, nuts, studs, shafts, and mountings.
- Engage the all wheel drive when traveling off highway on hilly terrain.
- Increase tire pressures before traveling in hilly terrain (do not exceed rated tire pressure).
- Use the assistance of someone on the ground as a guide when lateral or overhead clearance is close.
- After the vehicle/equipment has been moved to a new site, set all brakes and/or locks. When grades are steep, block the wheels.

## **Definitions**

**Class I, All-terrain vehicle (ATV):** A motorized off-highway vehicle, 50 in. (127 cm) or less in width, having dry weight of 800 lbs (362.9 kg) or less, and traveling on three or more low pressure tires (10 lbs [4.5 kg] psi or less), with a seat designed to be straddled by the operator.

**Class I, Category G, ATV:** An ATV intended for general recreational and utility use.

**Class I, Category U, ATV:** An ATV intended primarily for utility use.

**Class II, ATV:** A motorized off-highway vehicle with a width which exceeds 50 in. (127 cm) or having a dry weight that exceeds 800 lbs (362.9 kg), traveling on four or more low-profile, low-pressure tires (10 lbs [4.5 kg] psi or less) and having a bench seat.

**NOTE:** Utility Vehicles are designed to perform off-road utility tasks such as passenger and cargo transportation and are addressed separately below. Examples are Rangers, Rhino, M-Gators, Gators, and Mules.

**Rollover Protective Structure (ROPS).** A cab or frame that provides a safe environment for the tractor operator in the event of a rollover.

## **ALL TERRAIN VEHICLES (ATVS)**

### **Qualifications**

ATV operators will have completed a nationally recognized accredited ATV training course (such as provided by the Specialty Vehicles Institute of America or in-house resources that have been certified as trainers by an accredited organization) prior to operation of the vehicle.

The operator must pass an operating skills test prior to being allowed to operate an ATV. Proof of completion of this training will be maintained.

### **Equipment**

All ATVs shall be equipped with:

- An operable audible warning device (horn);
- Headlights (if it will be used during hours of darkness);
- Taillights; and
- Brake lights.
- Mufflers and spark arresters.

All Class II ATVs will be equipped with ROPS and seatbelts

### **Operation**

Only Class I and Class II ATVs with four or more wheels may be used. Class III ATV's may not be used.

The manufacturer's recommended payload will not be exceeded at any time.

Gloves and an approved motorcycle helmet with full-face shield or goggles will be worn at all times while operating a Class I ATV.

An ATV will not be driven on public roadways except to cross the roadway, and it will only be driven on a public roadway at designated crossing points or with a road guard (no paved road use unless allowed by the manufacturer).

A copy of the operator's manual will be kept on the vehicle and protected from the elements (if practicable).

Tires shall be inflated to the pressures recommended by the manufacturer.

Passengers are prohibited on Class I ATVs.

## UTILITY VEHICLES

Utility vehicles are defined as specialty Class II ATVs designed to perform off-road utility tasks such as passenger and cargo transportation. Examples are Rangers, Rhino, M-Gators, Gators, and Mules.

Utility vehicle operators shall be trained and familiar with the use of all controls; understand proper moving, stopping, turning and other operating characteristics of the vehicle. Operators must review all training materials provided by the manufacturer for the specific vehicles, and training should be in accordance with appropriate manufacturer recommendations. A copy of the operator's manual shall be kept on the vehicle at all times and protected from the elements. At a minimum, training should address:

- Basic riding tips from the manufacturer's published literature for each vehicle.
- Reading terrain.
- Climbing hilly terrain.
- Descending a hill.
- Traversing a slope.
- Riding through water.
- Cargo carriers and accessories.
- Loading and unloading.
- Troubleshooting.
- Proper preventative maintenance, (i.e., oil levels, tire pressure requirements and scheduled maintenance requirements according to the manufacturer's guidelines.).

Utility vehicles shall be equipped with:

- Operable audible warning device (horn).
- Headlights.
- Taillights.
- Brake lights.
- Seatbelts.
- ROPS.

Occupancy in utility vehicles is limited to manufacturer designated seating that has built-in seatbelts. Passengers may not ride in the vehicle's back cargo area unless the vehicle is otherwise equipped. Note: When used for emergency response, medical litters may be placed in the back cargo area but must be secured as described below.

The manufacturer's recommended load carrying capacity, personnel capacity, or maximum safe vehicle speed shall not be exceeded at any time.

Cargo items will be secured as necessary to prevent movement/tipping. All loads over fifty pounds (to include medical litters) must be securely strapped to cargo tie-downs in the rear and to the cargo shelf in the front.

Seatbelts will be worn by operators and passengers of specialty vehicles where installed by the manufacturer. Operators and passengers shall wear goggles at all times when a utility vehicle, not equipped with a windshield, is in motion.



Utility vehicles will not normally be driven on public roadways except to cross the roadway, and will only be driven on a public roadway at designated crossing points or with a road guard. Utility vehicles that are allowed to operate outside a controlled work area and/or on public roads will meet the minimum vehicle safety standards in accordance with 49 CFR 571.5, to include ROPs, seatbelts and placement of "Slow Moving Vehicle" emblems where required.

Manufacturer-installed safety equipment will be maintained in working order and used in compliance with the requirement of this regulation and in accordance with manufacturer's recommendations.

## **RULES**

Observe the following practices to help prevent accidents:

- Do not misuse utility vehicles.
- Reduce speed and exercise extreme caution on slopes or on rough ground.
- Do not overload vehicle and avoid shifting loads. Reduce load when operating over rough or hilly terrain.
- Do not stop or start suddenly when going uphill or downhill. Be especially cautious when changing direction on slopes.
- Stay alert for holes, rocks, and other hidden hazards in the terrain.
- Keep away from drop-offs, ditches, embankments, as well as ponds and other bodies of water. The machine could suddenly turn over if a wheel is over the edge of a cliff or ditch, or if an edge caves in.
- Keep front wheels straight at crest of hill or going over bumps.
- When descending a hill, remove foot from accelerator and apply brakes to reduce speed and maintain control.

## **Transport Loads Safely**

- Be sure load is evenly distributed.
- Do not load above the load guard.
- Securely anchor all loads in cargo box.
- Reduce cargo box capacity when operating on rough or hilly terrain.
- Use existing trails. Avoid terrain such as dangerous slopes and impassable swamps. Watch carefully for sharp bumps, holes, ruts, or obstacles.
- Look ahead at terrain. Know what is coming and be prepared to react. Be alert for hazards.
- Keep front wheels straight at the crest of a hill or going over bumps.
- Reduce speed according to trail, terrain, and visibility conditions.
- The passenger should always use the hand holds.

### **Climbing or Descending a Hill**

- Always use the brakes when going down slopes, the utility vehicle can speed up (freewheel) going down a slope. Engine or clutch braking effect is minimal.
- Balance loads evenly and secure them. Braking could shift the load and affect vehicle stability.
- Sit on the center of the seat and keep both feet within the foot platform.
- Never drive past the limit of visibility. Slow down near the crest of a hill until getting a clear view of the other side.
- If the vehicle stops or loses power going up a hill, lock the park brake to hold the vehicle on slope. Maintain direction of travel and release the brake slowly. Back straight down hill slowly while maintaining control. Do not turn the vehicle sideways. The vehicle is more stable in a straight forward or rearward position.
- If the utility vehicle begins to tip, turn the front wheel downhill to gain control before proceeding.

### **Riding Through Water**

- Avoid water whenever possible. If the drive belt becomes wet, slippage will occur and the vehicle will lose power.
- Never cross any body of water where the depth may be unknown to the operator. As an operational guideline, deep water is considered anything in excess of 152 mm (6 in.) in depth. Tires may float, making it difficult to maintain control.
- Choose a course within the waterway where both banks have a gradual incline. Cross at a point known to be safe.
- Proceed at a slow steady speed to avoid submerged obstacles and slippery rocks.
- Avoid water crossings where the operation of a utility vehicle may cause damage to waterway beds or erode waterway shoreline.

## **FLD 13 STRUCTURAL INTEGRITY**

### **RELATED FLDs AND PROGRAM**

*FLD 02 – Inclement Weather*

*FLD 23 – Cranes, Rigging, and Slings*

*FLD 24 – Aerial Lifts/Manlifts*

*FLD 26 – Ladders*

*FLD 27 – Scaffolding*

*FLD 28 – Excavating/Trenching*

*FLD 33 – Demolition*

*Personal Protective Equipment Program*

### **PROCEDURE**

Structural integrity hazards include those hazards associated with deteriorated conditions of containers (such as drums or tanks) and buildings (including appliances such as both elevated work platforms and fixed and portable ladders), scaffolding, and excavations or trenches. Structural integrity hazards also are associated with floor and wall opening covers and guards as well as guardrails as engineering controls for work at elevation. In construction activities, structural integrity is critical to steel erection and concrete construction. The failure of structures can cause significant injury or death to personnel.

#### **Recognition and Risk Assessment**

In the planning stages of a project and safety plan, the potential for injury due to structural integrity must be considered as a physical hazard in the site-specific Health and Safety Plan (HASP). With regard to the construction issues raised above, and during demolition, the project work plans, construction specifications, and Quality Assurance Programs must be designed to ensure structural integrity during and following construction. Risk assessments must be accomplished in the development stages of a project by listing in the HASP the most likely hazards which may occur associated with structural integrity. The field safety officer (FSO) in coordination with engineering, designers, architects and quality managers must make decisions on the proper safety procedures and recommend them to the project and site management. Each worker must evaluate the risk associated with his or her work and be actively alert to these hazards. Any site worker may stop work if safety procedures are not followed or the risk is too great.

Prior to entering any building, an assessment of structural integrity must be made. Buildings on inactive sites or facilities, unused buildings, and buildings which are to be demolished require special attention. This assessment must ensure, through observation and experience, that entering and/or task activities will not expose personnel to unusual risk of falling debris, loose materials that could be dislodged by touching or walking nearby, or walking on surfaces that cannot bear the weight of personnel. For steel erection, concrete work, and demolition, qualification requirements include registered Professional Engineers (PEs) proficient in structural integrity assessment. The registered PE must also ensure that construction is performed to specifications.



## **FLD 31 FIRE PREVENTION AND PROTECTION PLANNING**

Fire prevention and protection are key elements to any activity conducted. This FLD focuses on the understanding of fire hazards, protection and equipment options available for use, minimal inspection requirements for equipment and worksites, guidance on limiting fire hazards, training, and site-specific planning. The objectives of this program are to ensure that personnel can understand the hazards associated with fires, how to prevent fires from occurring, and how to act safely and appropriately in the event of a fire emergency.

### **RELATED FLDs AND PLANS**

*FLD 32 – Fire Extinguishers Required and Requirements*  
*Emergency Response Plan*  
*Health and Safety Plan*

### **RESPONSE ACTIONS**

In case of fire, immediately take the following actions:

- Evacuate the building or area in accordance with the evacuation plan. Activate fire alarms if they have not already been activated.
  - Use nearest exit.
  - Do not use elevators.
  - Close all doors behind you.
- Dial 911 or the established Fire Emergency Number from a safe location.
  - Indicate what is happening, location of fire, if any injuries.
  - Comply with requests from the 911 operator for information.
  - Do not hang up with the operator until told to do so by the operator, or they hang up first.

Upon completion of emergency phase comply with incident notification procedures.

**NOTE:** If the fire is small and manageable with fire extinguishing equipment at hand, and provided you are trained in the use of this equipment, you may make the decision to use this equipment while waiting for advanced assistance. Never place yourself in danger, always have a plan for escape, and never attempt to fight a fire if there are any doubts about the type of fire or your ability to successfully fight the fire. Never allow the fire to get between you and your escape route.

### **LIFE SAFETY**

- All workers are required to follow the Emergency Action Plan (EAP) and Health and Safety Plan (HASP) developed for the respective work location.
- Exit signs must be visible from all areas of a room.
- All exits maintained unobstructed, unblocked, and unlocked.
- Egress pathways maintained per National Fire Protection Association (NFPA) Standard 101. In no event less than 28 inches wide.

- Adequate and reliable illumination must be available.
- Provisions must be made within local EAPs to assist any potentially physically challenged personnel or visitors.

## **FIRE PROTECTION (EQUIPMENT AND PROCEDURES)**

### **Classes of Fire**

- Class A: Combustibles (e.g., wood, paper, cloth).
- Class B: Flammable and combustible liquids, gasses and greases.
- Class C: Denotes presence of electrical and energized electrical equipment.
- Class D: Combustible metals
- Class K: Combustible cooking media (e.g., oils and greases).

### **Type(s) of Fire Protection Equipment or Systems**

The following types of systems are typically used in most occupancy. In the event a different system is installed or anticipated, contact Environmental Compliance, Health, and Safety (EHS) Staff for assistance.

- Fixed Systems
  - Sprinkler Systems: Keep heat sources and dust generating sources away from sprinkler heads. Allow a minimum of 18 inches clearance below the sprinkler head. Do not paint sprinkler heads. Maintain working clearance around sprinkler control valves. Ensure that system tests are conducted in accordance with local fire code requirements.
  - Fire Hydrants and Fire Lanes: Ensure that clearance for fire fighting equipment (trucks) and fire fighters is maintained in fire lanes and around hydrants. Do not use fire hydrants for any purpose other than fire fighting unless express approval is obtained from the local fire department.
- Portable Fire Extinguishers
  - Selecting: Ensure that portable fire extinguishers are appropriate for the class and size of potential fire. Selection will be based on the more restrictive requirements of Occupational Safety and Health Administration (OSHA), NFPA, or Local fire code. Contact EHS staff for assistance as necessary.
  - Training and Education: In accordance with 29 CFR 1910.157 and NFPA Standard 10, WESTON will provide portable fire extinguisher general use education, routine inspection guidelines, and incipient fire hazard recognition and prevention training to all new employees upon initial employment and at least annually thereafter. The portable fire extinguisher training education will be documented and a record of that training will be maintained on file for a period of at least one year. Only persons who have been trained may use portable fire extinguishers.
  - Maintenance and Inspection: Maintenance and inspection will be in accordance with 29 CFR 1910.157 and NFPA Standard 10. Each portable fire extinguisher inspection documentation/tags shall include the fire extinguisher type and/or identifier, the person inspecting, date of the routine inspection, date of last recharge, and the date of the annual maintenance check by a qualified person. Each portable fire extinguisher shall document at least a monthly visual inspection by a trained inspector and shall consist of the following:

- Annual maintenance check.
- Appropriate pressure charge.
- Clean and clear discharge port or hose used in lieu thereof.
- Pressure handle pin in place and secured.
- Extinguisher properly mounted.
- Extinguisher properly identified
- Each inspection period to include both annual and routine inspections for active and stored portable fire extinguishers will be documented and documentation will be maintained on file for a period of at least one year after the last entry or the life of the shell, whichever is less. The inspection and maintenance record will be available to the assistant secretary of OSHA, or any other responsible authority upon request.
- Alarm Systems
  - Fixed alarm systems are to be installed, maintained, and tested by approved vendors.
  - In the event of a fire emergency alarm, immediately evacuate.
- Fire Doors
  - All doors designated as fire doors are to remain closed.
  - In the event of a fire, close (but do not lock) all doors while evacuating.

#### **Incident Notifications and Actions**

*Any* discharge of a portable or fixed fire extinguishing system requires Notice of Incident (NOI) reporting. Discharged extinguishers are to be replaced immediately by acceptable units and the discharged units submitted for testing and recharge.

#### **Responsibilities**

##### **EHS Staff**

- Assists management in determining appropriate numbers and types of fire protection equipment and/or systems based upon site or building criteria.
- Verifies through inspection that fire extinguishers and systems are properly selected, used, and maintained.
- Provides technical assistance to management and reviews plans to ensure that fire hazards are limited.

##### **Management (OU, Office, Project, and Site)**

- Ensure that occupancies have appropriate numbers and types of fire protection equipment and/or systems.
- Ensure that required inspections of equipment and systems are conducted.
- Ensure that any deficiencies in equipment or systems are corrected in a timely manner without impact to overall fire protection of occupancy.



- Designates a person or persons to be responsible for the selection, purchase, repair or replacement of portable fire extinguishers and as necessary, other fire protection systems for site or building/occupancies.
- Ensures, as appropriate, that personnel are trained in the use of portable fire extinguishers.
- Ensure that all affected personnel are trained in the EAP and evacuation procedures.
- Notifies EHS staff and others, as appropriate, prior to building modifications, site activities, or other tasks that impact fire prevention and protection.
- Ensures that flammable and combustible materials are used and maintained in a safe manner.
- Ensures that housekeeping is routinely conducted.
- Ensures that heat producing materials and equipment are properly rated, used, and maintained.

#### **All Personnel**

- Take all appropriate measures to limit fire hazards.
- Report all fires.
- Evacuate as trained and directed in the event of an emergency.
- Do not prop open fire doors.
- Keep exits and exit ways clean, clear, and unblocked.
- Take all appropriate measures to limit fire hazards.
- Use and store flammable and combustible materials appropriately.

### **FIRE PREVENTION AND PROTECTION (LIMITING HAZARDS)**

#### **Flammable and Combustible Materials (liquids, gases)**

- Flammable materials must be properly labeled, stored, handled, and used.
- No smoking or use of open flame-producing devices within 50 feet of flammable and combustible materials.
- Obtain Material Safety Data Sheets (MSDS) for all flammable materials in use and ensure all personnel are aware of hazards.
- All containers are to be properly labeled with contents, the word Flammable, and in accordance with hazard communication requirements.
- Store materials in well ventilated areas that are free of ignition sources and flame or sparks.
- Ensure that incompatible materials are stored in remote locations from each other (e.g., keep flammables from oxidizers).
- Limit quantities to minimum required.
- Store cylinders in upright and secure positions.
- Bond and ground containers as (and where) necessary.
- Use proper storage cabinets for flammable and combustible materials. Contact EHS Staff for assistance.

- Use only approved containers.
- Use and dispense only in well-ventilated areas.

#### **Combustible Materials (solids)**

- Solid combustible materials include; wood, paper, and cloth. Proper housekeeping reduces concerns for combustion of these materials. Use proper receptacles for disposal and dispose of routinely.

#### **Oxidizers**

- An oxidizer is a substance that increases the flammability of materials, allowing them to burn easier. Examples include; pure oxygen, chlorine, ammonium nitrate. Store oxidizers in a remote location from flammable and combustible materials.

#### **Electric Appliances**

- Do not use electric appliances near flammable or combustible materials. Never place an appliance on an unstable surface. Use on UL or FM approved appliances. Follow the manufacturer's recommendations or requirements for use and maintenance. Obtain approval from EHS staff prior to purchase and use of portable heater units in office settings. Do not leave portable heaters on and unattended.

#### **Hot Work Permits**

- A permit is required for any "hot" work such as; welding, brazing, and cutting or the use of an open flame device (other than that by an FM or UL approved device used in accordance with manufacturer's requirements).
- Hot work permits will be issued by local or site EHS staff, or as designated by project management. Permits are typically associated with one task and for one shift. At the discretion of local EHS personnel, permits may be authorized for longer periods.

#### **Smoking**

- Smoking is prohibited indoors. Smoking is only allowed in outdoor, designated areas. Smokers are to maintain smoking areas in a clean and safe condition. Ensure that receptacles for disposal of cigarettes and other smoking materials are appropriately constructed, free of combustible debris and when necessary, are cool before emptying into waste receptacles.

#### **Housekeeping**

- All personnel are responsible for keeping work areas free of combustible materials and debris.
- Weeds and grass must be properly maintained to limit potential fire hazard.

### **FIRE PREVENTION AND PROTECTION MINIMUM REQUIREMENTS**

OSHA outlines minimum requirements for emergency evacuation planning and fire prevention plans (see [www.osha.gov](http://www.osha.gov)). Site-specific HASPs are developed to implement these requirements.

**For evacuation planning, the minimum requirements are:**

- **Description of routes and procedures to follow.**
- **Procedures for accounting of personnel.**
- **Procedures for evacuation of physically impaired employees where necessary.**
- **Procedures for those employees who must remain temporarily behind to shut down critical equipment before they evacuate.**
- **Alerting systems must be identified.**

**Training must be conducted for all employees on what to do in the event of an evacuation emergency.**

## **FLD 39 ILLUMINATION**

### **RELATED FLDs**

*FLD 08 – Confined Space Entry Program*  
*FLD 10 – Manual Lifting and Handling of Heavy Objects*  
*FLD 12 – Housekeeping*  
*FLD 13 – Structural Integrity*  
*FLD 18 – Operation and Use of Boats*  
*FLD 22 – Heavy Equipment Operation*  
*FLD 23 – Cranes, Rigging, and Slings*  
*FLD 33 – Demolition*  
*FLD 38 – Hand and Power Hand Tools*

### **PROCEDURE**

While work is in progress, offices, facilities, access-ways, working areas, construction roads, etc., will be lighted by at least the minimum light intensities specified in Table 1.

Office lighting will be in accordance with American National Standards Institute (ANSI)/ Illuminating Engineering Society of North America (IESNA) RP-1.

Roadway lighting will be in accordance with ANSI/IESNA RP-8.

Marine lighting will be in accordance with ANSI/IESNA RP-12.

### **Means of Egress**

- Means of egress will be illuminated, with emergency and non-emergency lighting, to provide a minimum of 1 footcandle (fc) (lumens per square foot [ $\text{lm}/\text{ft}^2$ ]) (11 lux [lx], measured at the floor. (Reference NFPA 101)
- The illumination will be arranged so that the failure of any single lighting unit, including the burning out of an electric bulb, will not leave any area in total darkness.

Lamps and fixtures will be guarded and secured to preclude injury to personnel. Open fluorescent fixtures will be provided with wire guards, lenses, tube guards and locks, or safety sockets that require force in the horizontal axis to remove the lamp.

Lamps for general illumination shall be protected from accidental contact or breakage. Protection shall be provided by elevation of at least 7 ft (2.1 m) from normal working surface or suitable fixture or lamp holder with a guard.



**TABLE 1 - MINIMUM LIGHTING REQUIREMENTS**

Facility or Function	Illuminance – lx (lm/ft <sup>2</sup> )
Accessways	
– general indoor	55 (5)
– general outdoor	33 (3)
– exitways, walkways, ladders, stairs	110 (10)
Administrative areas (offices, drafting/meeting rooms, etc.)	540 (50)
Chemical laboratories	540 (50)
Construction Areas	
– general indoor	55 (5)
– general outdoor	33 (3)
– tunnels and general underground work areas, (minimum 110 lx required at tunnel and shaft heading during drilling, mucking, and scaling)	55 (5)
Conveyor routes	110 (10)
Docks and loading platforms	33 (3)
Elevators (freight and passenger)	215 (20)
First-aid stations and infirmaries	325 (30)
Maintenance/Operating Areas/Shops	
– vehicle maintenance shop	325 (30)
– carpentry shop	110 (10)
– outdoors field maintenance area	55 (5)
– refueling area, outdoors	55 (5)
– shops, fine detail work	540 (50)
– shops, medium detail work	325 (30)
– welding shop	325 (30)
Mechanical/electrical equipment rooms	110 (10)
Parking areas	33 (3)
Toilets, wash, and dressing rooms	110 (10)
Visitor areas	215 (20)
Warehouses and Storage Rooms/Areas	
– indoor stockroom, active/bulk storage	110 (10)
– indoor stockroom, inactive	55 (5)
– indoor rack storage	270 (25)
– outdoor storage	33 (3)
Work areas – general (not listed above)	325 (30)

## **FLD 40 STORAGE TANK REMOVALS AND DECOMMISSIONING**

### **RELATED FLDs AND PROGRAMS**

*Occupational Noise and Hearing Conservation Program*

*FLD 02 – Inclement Weather*

*FLD 05 – Heat Stress Prevention and Monitoring*

*FLD 06 – Cold Stress*

*FLD 08 – Confined Space Entry Program*

*FLD 10 – Manual Lifting and Handling of Heavy Objects*

*FLD 12 – Housekeeping*

*FLD 16 – Pressure Systems: Compressed Gas Systems*

*FLD 22 – Heavy Equipment Operation*

*FLD 24 – Aerial Lifts/Manlifts*

*FLD 25 – Working at Elevation/Fall Protection*

*FLD 26 – Ladders*

*FLD 27 – Scaffolding*

*FLD 28 – Excavating/Trenching*

*FLD 30 – Hazardous Materials Use and Storage*

*FLD 31 – Fire Prevention and Protection Planning*

*FLD 32 – Fire Extinguishers Required and Requirements*

*FLD 34 – Utilities*

*FLD 35 – Electrical Safety*

*FLD 36 – Welding/Cutting/Burning*

*FLD 37 – Pressure Washers/Sandblasting*

*FLD 38 – Hand and Power Hand Tools*

*FLD 54 – Benzene Exposure Control Plan*

### **INTRODUCTION**

Both aboveground and below ground storage tank removal and decommissioning present numerous hazards and represent significant risk to site workers, the environment, and the public. The proper planning and completion of this work will ensure the safety of personnel performing the task and the public. The types of hazards encountered include:

- Fires and explosions from the ignition of flammable or combustible vapors
- Toxic, corrosive, or reactive materials contained in the tank
- Working in confined spaces and excavations
- Pressurized or energized lines and utilities
- Mechanical equipment and heavy equipment operation
- Falls when working at elevations and on weathered and corroded structures
- Hotwork, including welding and cutting
- Hand and power tools

In addition to the guidance in this operating procedure and the field operating procedures referenced above, procedures presented in American Petroleum Institute (API) Publications 1604, 2015, 2015A and 2015B, National Fire Protection Association (NFPA) documents, and all applicable state and local regulations relating to storage tank removal and decommissioning, must be considered for the safe removal and decommissioning of storage tanks prior to initiating field work.

## **KEY PERSONNEL AND RESPONSIBILITIES**

### **Site Supervisor and/or Site Safety Officer**

The Site Supervisor or Field Safety Officer (FSO) will:

- Ensure this procedure and all elements of the Site Health & Safety Plan (HASP) and Weston's Environmental Compliance, Health, and Safety (EHS) Program are implemented.
- Constantly reassess site conditions and work practices to recognize unanticipated unsafe practices or conditions and take appropriate corrections, including cessation of operations until the hazard is abated.
- Ensure all employees are familiar with these procedures and the requirements of the HASP.

### **Site Emergency Coordinator**

The Site Emergency Coordinator, who can also be the certified remover, will:

- Respond to all non-routine events that occur during tank removal or decommissioning activities including:
  - Medical Emergencies
  - Confined Space Rescue
  - Spills or Releases
  - Fire or Explosion
  - Security Breaches
- Provide guidance and coordination in response actions to ensure the safety of personnel and the public and to ensure that all activities are completed in accordance with applicable regulations and WESTON policy.
- Be familiar with all contingencies and contingency response plans specific to the site.
- Be prepared at all times during site operations to implement each Contingency Plan.

### **Project Manager**

The Project Manager, or his/her designated alternate, will:

- Approve the HASP with signature.
- Ensure implementation of the HASP.
- Facilitate any required corrective actions.

### **Site Personnel**

All employees working on the site will follow the requirements of this procedure.

## **PLANNING ELEMENTS**

The following steps outline the process to follow to plan an effective tank removal and decommissioning. These actions will be completed by the Site Supervisor or FSO, with input, as necessary, from the Site Emergency Coordinator and others as identified.

## **Background Information and Communications**

- Obtain information regarding present and past tank contents. Examples of sources for information include Material Safety Data Sheets (MSDSs), labels on tanks and records of product received and shipped from the site, and State and Local storage tank registration requirements. The project HASP and WESTON EHS Portal site are also sources for product information. The API and NFPA documents provide recommendations for inerting for safe handling and dismantling of storage tanks which cannot be completely emptied or cleaned.
- Confirm the product information and update the project HASP, as necessary.
- Revise and update all Contingency Plans to ensure that identified response actions are clearly identified and consistent with WESTON requirements and applicable regulations.
- Review all procedures including response actions and relevant chemical information with personnel before beginning work.
- Implement an effective HAZCOM program to include multi employer worksite conditions, as appropriate.

## **Site Access, Control Access, Characterization and De-energization**

- Establish a site control system using tape or other readily identifiable system to mark boundaries and properly sized work zones.
- Control accesses to the site to ensure only essential and authorized personnel are in the work area.
- Set up decontamination lines.
- Implement a Zero Energy procedure to identify and shutdown all sources of energy, including utilities, electrical devices, pressurized lines, steam lines, chemical and gas lines; and stored mechanical energy; such as agitators or other mechanical implements in and around each tank. The steps in the process include instituting lockout/tagout, de-energization, blocking, line breaking and blinding, shielding and guarding, or other acceptable controls to avoid exposure.
- Monitor the area around tanks and conduct atmospheric testing at appropriately positioned/located openings on the tanks to evaluate explosive, oxygen rich or deficient and toxic environments. Continue to monitor according to the HASP air monitoring plan throughout the removal process. The results of atmospheric testing will be evaluated with respect to lowest established exposure limits and appropriate actions taken.

## **Preparation of Tank(s):**

The following steps will be completed by the Site Supervisor or FSO, with input, as necessary, from the Emergency Coordinator and others as identified:

- Disconnect all fill and removal lines from the tank(s) in a manner to ensure no spillage of contents or fires. Safe line breaking procedures as presented in applicable industry standards and practices will be used.
- Monitor the atmosphere inside the tank at as many locations as possible and at all levels from the top to just above the content level. Take appropriate precautions as indicated below:
- Unknown contents - If contents of tank are unknown, there is concern about the contents, or there are no samples to confirm the contents, the opening of an unknown tank will be completed with



personnel wearing Level B personal protective equipment (PPE) using remote opening devices and workers protected by blast/splash shields in accordance with 29 CFR 1910.120 (j).

- Known contents, elevated Combustible Gas Indicator (CGI) readings – If the CGI reading at any level inside the tank is 10% of the lower explosive limit (LEL) or greater, the tank must be purged with air, while controlling the emissions and performing air monitoring in the vicinity of the tank, or inerted to maintain oxygen (O<sub>2</sub>) concentration less than 8%. Bonding and grounding will be installed, prior to initiating activities, including material handling or cleaning. The tank must be inerted, if handling of the tank could change conditions and increase the concentration of combustible gas or vapors.
- Remove liquid contents of tanks using appropriate equipment and practices, for example bonding and grounding, and procedures to contain and control potential spills.

### **Limitations**

Each tank removal/cleanout may present unique hazards which are not covered by this procedure and for that reason every application of this procedure must be reviewed and approved by the Division Environmental, Health, & Safety Manager (DEHSM) before work begins, with the review completed by, preferably, a tank cleanout specialist.

Likewise, even after the use of this procedure is approved, the FSO must exercise vigilance. Whenever unusual conditions are discovered which could possibly affect safety during tank work, those conditions must be described to the DEHSM before work continues. In particular, no torch, arc or saw cutting shall take place, unless performed in accordance with procedures in this document, including approval from the DEHSM.

Many localities have ordinances or regulations which require the use of alternate procedures for making tanks fire-safe. Where local procedures exist, they will be fully understood and described in a written plan. The job-specific procedures for the tank removal will be approved by a qualified individual, such as a tank removal specialist, with the DEHSM before being implemented.

### **THE PROCESS STEPS FOR A TANK CONTAINING FUEL OIL AND GASOLINE**

The following procedures for tank remediation and decommissioning are based on the assumption that the tank contained either gasoline or fuel oil and that the attached tank schematic accurately describes the tank installation. This procedure does not apply to tanks located within buildings or other enclosures which could limit the natural ventilation in the work area outside the tank. In some cases, this procedure may be extended to tanks which contained other material with basically similar hazards, but this may only be done with the specific approval of the DEHSM.

#### **Identification of General Hazards and Controls**

This section discusses general issues concerning the hazards and the controls when removing or decommissioning storage tanks that contain fuel oil and gasoline.

#### **Hazards**

- Gasoline and Fuel Oil, including waste oil tanks.
  - Gasoline and fuel oil are toxic. Gasoline can contain benzene, tetraethyl lead, ethylbenzene, toluene, and xylene.

- Gasoline is a flammable liquid.
- Fuel oil is a combustible liquid but can produce flammable vapors if heated.
- Gasoline and fuel oil vapors when heated in enclosed spaces can expand rapidly to result in explosions.
- Unexpected hazardous materials, such as waste solvent, are sometimes deposited in tanks without the owner's knowledge.
- General construction site hazards, including power equipment, operating vehicles, falls, slips and trips, and changing work conditions and environmental conditions.
- Excavation hazards.
- Utilities located underground and overhead.

### Controls

The following procedures, or approved alternatives, will be followed to control site fire hazards.

- **Flammability Assessment.** This evaluation involves identifying the flammability of materials and liquids that could be encountered on the site and identifying the operations to be performed which have the potential to create hazardous conditions, such as fires, if performed incorrectly in the vicinity of combustible and flammable materials.

**Source Assessment.** In this review, the tasks to be performed are evaluated and assessed to identify their potential to generate heat and ignition sources. In addition, this assessment will identify locations and concentrations of toxic vapors.

- **Controls Identification.** The information from the Flammability Assessment and the Source Assessment are combined to identify the appropriate control strategies. The controls include engineering controls, such as inerting the space and placing fire-resistant blankets around the work area; administrative controls such as using a fire watch and performing the task at a location away from the flammable material; and personnel protective equipment, such as basic hot work clothing.

For more information concerning fire hazards and fire control strategies see FLD 31.

Whenever possible, due to the potential for flammable or explosive atmospheres, intrinsically safe equipment will be used.

Site-specific training must be provided and documented to all personnel to ensure that they understand the procedures and practices that will be used at the site.

The following table identifies the criteria to evaluate the results of sampling obtained using the Combustible Gas Indicator and Oxygen Meter (CGI/O<sub>2</sub>), the Photoionization Detector (PID)/Flame Ionization Detector (FID), and colorimetric indicator tubes.

**Table 1: Action Levels**

INSTRUMENT	TASK	LEVEL	ACTION
<b>Fuel Oil</b>			
FID/PID	All	5 units above background	go to level C

INSTRUMENT	TASK	LEVEL	ACTION
(breathing zone)		50 units above background	go to level B
		100 units above background	stop work and reevaluate WORK PLAN
CGI (inside tank)	2, 4, 5, 6, 7	>10 % LEL	Evacuate work area, inert tank
CGI (Outside tank low areas)	1, 2, 4, 5, 6, 7	>20 % LEL	Evacuate work area find source and control
O2	2, 4, 5, 6, 7	<19.5 %	Go to Level B
		>23%	Evacuate, find source of O2, vent until within normal range
Gasoline			
FID/PID (breathing zone)	All	1-5 units above background	Go to Level C
		>5 units above background	Use colorimetric detector tube for benzene
		>50 units	Go to Level B
		>500 units	Evacuate work area and ventilate or purge until below 250 units.
Colorimetric tube (0.5 PPM benzene, breathing zone)		>1 PPM for 2 successive readings 10 min. apart	Go to Level B
CGI (inside tank)	2, 4, 5, 6, 7	>10% LEL	Purge tank
CGI (outside tank)	4, 5, 6, 7	>20 % LEL	Evacuate work area, find source and low areas control
O2 (breathing zone)	2, 4, 5	>19.5 O2	Go to Level B
		> 23% O2	Find source of O2, vent until within normal range

### **Task by Task Risk Analysis and Procedures**

The following sections address in greater detail specific elements and activities for the effective remediation and decommissioning of a tank. While the discussion identifies tasks, the sequence of the tasks in this FLD is not necessarily the sequence for the completion of a tank removal and decommissioning. The specific sequence of tasks at a site will depend on the conditions at the site.

#### **Confirm Tank Design and Piping Configuration and Shutdown Energy Systems**

This task focuses on identifying and understanding the location, design and construction of the tank. The scope of this task includes the configuration of the piping systems and the types and power associated with energy systems.

The first step involves obtaining and reviewing a site plan and any drawings or plans that identify the location, history and construction of the tank. Ideally, the site plan will identify the location of both above and below grade pipe and utility lines. The client or other responsible parties will be asked to confirm locations of underground utilities or pipelines.

A visual inspection of the site will be performed. This survey may provide additional information concerning the utilities and systems associated with the tank. Inspecting the area around tank can provide information concerning:

- Contents from posted signs or labels,
- Piping and electrical connections and other appurtenances from the locations of panel boxes and overhead lines, water hydrants and fire suppression systems, etc.
- The locations of vents, discharge lines and filling lines.

The Project Manager will be responsible for ensuring the completion of steps to assess the types and locations of utilities and for maintaining documentation of all surveys and communications. In addition to recording information on drawings and site plans, the location of subsurface utilities will be marked on the ground.

A utility service locator, such as Safe Dig or One Call will be contacted. This action is required by law and not making this contact can have significant legal implications. If necessary the utility service locator will be requested to come to the site.

After the types, locations and magnitudes of utilities and energy systems are identified, the Project Manager, the FSO, and the DEHSM will develop procedures and identify the sequence of steps to ensure the safe shutdown and de-energization of all power to the tank, including electrical and mechanical power. The steps will identify the sources of power or stored energy and the specific actions that will be taken to shutdown each source through lockout/tagout, physically disconnecting the line, and blocking, blinding or draining. Each pipeline connected to the tank shall be disconnected, blanked or locked off and tagged. Electrical disconnections shall be performed by a qualified electrician (See FLD 35, Electrical Safety). Pipeline disconnections may be hazardous due to the contents in the pipe and will be accomplished using appropriate care, including facility or project-specific line breaking procedures.

### Hazards

The following discussion focuses on the potential hazards to personnel working on-site. However, the implications of improperly identifying and securing utilities extend into the larger community, and include both safety and economic impacts.

- Inhalation exposure to and skin contact with the tank or line contents.
- Ignition of vapors from static charges or other ignition sources.
- Exposure to electrical and other forms of stored energy
- General safety hazards associated with working on an outdoor construction site.

### Controls

- Level D PPE, modified to include chemically protective gloves when working directly with pipelines and pumping equipment. The type of glove to be worn will depend on the chemical(s) contained in the tank and the piping systems.
- Site-specific procedures will be developed and reviewed to ensure the proper planning and completion of the shutdown tasks, and will address lockout/tagout requirements, the potential for pressure caused by product in lines or closed tanks and inherent vapor pressure of products, and the steps to open lines and covers so a sudden release does not result in splash, vapor release, or propelling of a loosened cap or line into a person's face or body.



- Personnel who are trained and, if necessary, qualified will complete the shutdown and securing of energy systems.
- Air monitoring will be performed using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.
- Only qualified electricians may connect or disconnect high voltage electrical power.

#### Tank Emptying

The emptying of a tank will be completed by an experienced person. During the process, steps will be taken to ensure the integrity of equipment and that controls are in-place to minimize the potential for spills and releases to the environment.

The procedures for emptying the tank will be developed prior to the start of the task and will be reviewed with each person working on-site to ensure awareness concerning the task and the contingencies that may be implemented.

The general procedures for emptying the tank involve:

- Using existing lines for removing the liquid.
- Emptying the contents using an explosion proof suction pump connected to existing lines or a gravity drain using the existing line.
- While the discharge line is frequently the best choice, the fill line can be used.
- The line used must draw liquid from or near the bottom of the tank.
- Suction lines and pumps must be electrically bonded to the tank or otherwise grounded to prevent electrostatic ignition hazard.
- The suction equipment must be designed for flammable liquid and must be compatible with the tank contents.
- Using an external liquid removal system which is not part of the tank system.
- If a vacuum truck is used, the area around the truck must be free of flammable vapors and the vacuum pump exhaust gases must be discharged through a hose of adequate size and length downwind of the truck and tank area.
- If the liquid is transferred into drums, the drums will be of an approved type. They will be positioned at all times to minimize the potential for spills and handled using appropriate equipment.
- In order to remove the tank contents, a small amount of water may be added to float tank residues to the level of the discharge line. This will only be performed if the addition of water is compatible with the contents of the tank.
- In order to evaluate if the tank is safe for subsequent operations the tank gases must be examined for flammability using a CGI and O2 Meter.

The specific procedures will depend on the configuration and location of the tank and the requirements for handling the contents of the tank.

The removed materials will be handled and stored at secured locations in accordance with applicable regulations. Any material shipped from the site will be transported by an approved shipper. A copy of all shipping documents will be maintained by the Project Manager.

### Hazards

- Inhalation exposure to and skin contact with the tank contents.
- Manual material handling associated with the moving of equipment and drums.
- Ignition of vapors from static charges or other ignition sources.
- Flammable vapors and exhaust from the vacuum truck.

### Controls

- At a minimum, modified Level D PPE, to include chemically protective gloves will be worn by personnel supporting the draining operation. Personnel directly involved in the task, for example connecting or disconnecting lines and working in close proximity to monitor the draining operation, will wear Level C PPE that includes a respiratory protection with an organic vapor canister, a face shield, if a full-face respirator is not worn, and appropriate chemical resistant gloves and clothing.
- Personnel who are trained and, if necessary, qualified will complete the shutdown and securing of energy systems.
- Air monitoring will be performed in the work area using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.
- Air monitoring will be performed of the atmosphere around the tank and tank connections, particularly in low areas, with a CGI/O<sub>2</sub> meter. Any area where the LEL exceeds 10% will be ventilated to bring the LEL level below 10% before proceeding.
- Eliminate all possible sources of ignition (i.e. pilot lights, non-explosion proof electrical equipment, internal combustion engines from within 25 feet of the tank, pumping system and vacuum exhaust).
- Ensure the pumping system is bonded or grounded, compatible with the tank contents and designed to handle flammable liquid.

### Accessing the Manway and the Top of the Tank

This task applies to work on a tank located below grade. For aboveground tanks, where access does not require excavating, the sequence of work continues with the "Opening Access Manway" section.

Prior to starting the excavation, the location of the access way will be evaluated to confirm the stability of the area and to plan the task for removing and placing of soil. This planning is critical to avoid subsidence or collapse of the soil or the tank, and to ensure the proper staging of removed soil and debris.

Accessing the tank manway may be completed using hand tools. When the manway is buried under paving or backfill, excavation using powered equipment may be required to remove the cover material. The specific approach to be used will be defined by the conditions at the site.

Based on the contents of the tank, the condition of the tank and the location of the vent pipe, it may be necessary to create an inert atmosphere in the tank prior to accessing the manway. Atmospheric testing will be performed using the CGI/O<sub>2</sub> meter and the PID/FID and evaluating the concentrations. If the conditions indicate the need to inert the space, the elements in "Inerting the Tank and Evaluating the Concentrations of Flammables in Tank Exhaust" will be followed.

The soil and overburden removed during the excavation will be stored to control run-off and to facilitate disposal, especially if there is visual or olfactory indications of contamination or the results of testing indicate the presence of contamination in the soil. If possible, the soil will be segregated to separate impacted soil from non-impacted soil. Separating these materials will facilitate handling, reduce the amount of soil for disposal, and identify whether excavated materials can fill the hole after the tank is removed.

#### Hazards

- Heavy equipment hazards from operations and to the operator due to the potential for collapse of the ground as cover is removed to access the tank.
- Power hand tools associated with digging activities.
- Inhalation exposure to and dermal contact with the tank contents.
- Flammable vapors emanating from tank or surrounding soil.
- Underground utilities

#### Controls

- Level D PPE modified to include chemically protective gloves when working directly with pipelines and pumping equipment. The type of glove to be worn will depend on the chemical(s) contained in the tank and the piping systems.
- Follow Heavy Equipment Operation FLD 22.
- Follow Hand and Power Hand Tools FLD 38.
- Air monitoring will be performed using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.
- Air monitoring will be performed of the atmosphere around the tank and tank connections, particularly in low areas, with a CGI/O<sub>2</sub> meter. Any area where the LEL exceeds 10% will be ventilated to bring the LEL level below 10% before proceeding.
- Follow Utilities FLD 34.

#### Opening Access Manway

The opening of the manway will be performed using non-sparking tools. The initial opening need only be large enough to permit entering hoses to take CGI/O<sub>2</sub> readings. Measurements should be obtained at both high and low points in the vessel and as far laterally in the tank from the opening as possible. The results of the testing will be compared to the identified criteria and to the upper explosive limit (UEL) / LEL values for the tank contents.

After the CGI/O<sub>2</sub> sampling, testing should be performed using the FID and PID to evaluate the concentrations of contaminants with respect to the applicable action limits.

After this initial testing, the tank must be monitored continuously during subsequent operations because additional flammable vapors may be produced when the residues are disturbed or heated. If the results of testing indicate, at any time, the tank needs to be purged, then the manway cover will be replaced and the space purged as described in the "Checking Tank Conditions, Flushing, and Cleaning" section. If atmospheric conditions in the tank are acceptable with respect to the action levels, the bottom residue can be removed using vacuum liquid handling equipment as identified in "Inerting the Tank and Evaluating the Concentrations of Flammables in Tank Exhaust" section.

A tank entry will not be made unless there is no alternative. Entry into the tank will only be made by personnel trained in accordance with the OSHA Permit-Required Confined Space Standard (29 CFR 190.146) and WESTON FLD 08, and when the atmospheric conditions are acceptable: the O<sub>2</sub> level is no lower than 19.5%, the CGI indicates less than 10% of the LEL for the chemical in the tank, and the concentration of the toxic vapors is less than the action limit. A tank will not be entered when the concentration of flammable or combustible vapors is equal to or greater than 10% of the LEL. If the tank must be entered while the tank is oxygen deficient or the concentration of the toxic vapors or gas is equal to or greater than the action limit, the DEHSM's approval is required, to ensure that confined space entrance procedures are in-place and that personnel are trained to use Level B PPE.

If a manway does not exist on the tank, contact the divisional or corporate health and safety department for approval before initiating cold (pneumatic shear) cutting to create an access. Any cutting before an interior inspection of the tank can be performed will be done in accordance with a hot work permit and with divisional and corporate EHS approval.

#### Hazards

- Power and hand tools.
- Inhalation exposure to and skin contact with tank contents and from vapors from tank or surrounding soil.
- Flammable conditions due to tank contents.
- Low oxygen level in tank

#### Controls

- Follow FLD 38 – Hand and Power Hand Tools and use intrinsically safe tools at locations and in operations where flammable gases may be present.
- Air monitoring will be performed using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.
- PPE (Level D) modified as a minimum outside tank, with level B used in the event of entry into the tank, including when only the head is placed inside of the tank to position suction lines.
- Continuously air monitoring the atmosphere around the tank and tank connections, particularly in low areas, with a CGI/O<sub>2</sub> meter. Any area where the LEL exceeds 10 % will be ventilated to bring the LEL level below 10 % before proceeding.



After residues are removed, CGI/O2 readings will be taken at, at least, four elevations inside of the tank. The conditions in the tank will be monitored continuously during subsequent operations because additional flammable vapors may be released when residues are disturbed or heated. If at any time the tank needs to be purged, then the manway cover will be replaced and purged as describe under the "Checking Tank Conditions, Flushing, and Cleaning" section. If the atmospheric conditions in the tank meet "SAFE" criteria then ventilate using a blower and monitor continuously to evaluate the LEL and O2 levels. Blower and blower duct must be grounded and electrically bonded to the tank.

#### Checking Tank Conditions, Flushing, and Cleaning

This task focuses on evaluating the condition of the tank and the procedures to flush and/or clean the tank to remove residual material. The steps in the activity include:

- Opening the tank using a non-sparking tool.
- Obtaining CGI/O2 readings at both high and low points in the tank and as far laterally from the opening as possible.
- Identifying the type and location of residual materials in the tank.
- Identifying the proper equipment and procedures to remove the residue and attaching and operating the tank flushing/cleaning device in accordance with manufacturer's instructions.

Conditions in and around the tank must be monitored during subsequent operations because additional flammable vapors may be produced when the residues are disturbed or heated.

Whenever possible, vacuuming should be done without entering the tank. High pressure associated with the power washer hazards and the vacuum line suction vacuum line.

#### Hazards

- Inhalation exposure to and skin contact with toxic tank contents
- Ignition of vapors from static charges or other spark source
- Heavy manual labor
- Operating high pressure cleaning systems, including the high pressure lines, moving components on equipment and fuel for the units.
- Use of hand tools.

#### Controls

- Continuously monitor the atmosphere in the tank and at tank openings and connections, particularly in low areas, with a CGI/O2 meter. Any area where the LEL exceeds 10 % will be ventilated to bring the LEL level below 10 % before proceeding.
- Air monitoring will be performed using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.

- Follow Pressure Washers FLD 37.
- Ensure proper storage of flammable liquids on-site

#### Inerting the Tank and Assessing Flammability

The following bullets identify general information concerning liquids identified in this FLD.

- Gasoline is a Class 1B flammable liquid with flash point of -45°F, a boiling point of 102°F and an UEL of 7.6% and an LEL of 1.4%.
- Fuel oils, including kerosene, diesel and fuel Oils 2 - 6 are classified as combustible liquids because their flash points ranging from 100 to 270°F. Kerosene has an UEL of 5% and an LEL of 0.7%.

Atmospheric testing will be performed to ensure that the tank is safe for subsequent operations by assessing flammability using a CGI and O2 Meter. If flammable vapors are present then the tank must be purged or inerted before proceeding.

The following discusses two approaches to inerting the space. Independent of the method used, general procedures involve:

- Ensuring all pipelines and other openings, including the manway, are plugged or closed except for the fill line and the vent line. This step controls the potential exit points for flammable gases and avoids "short circuiting" of the inert gas flow.
- Introducing an inert gas or dry ice through the fill pipe (or other appropriate tank opening). The desired location for adding inert gas is at the end of the tank opposite the vent line, with the inert gas released near the bottom of the tank. When an inert gas is added from a cylinder, the flow will be controlled using a pressure reducer valve connected to a gauge and the pressure will be kept at 5 PSI or less.
- The inert gas supply line will be grounded to the fill line.
- Ideally the vent line will be high enough or located to dilute and disperse the gases exiting the tank away from work areas and other receptors. If the vent line is not suitably located, then the area down wind should be marked to prevent entry by unauthorized personnel. Another option involves extending the height of the stack.
- If a ladder is needed to access the vent line, follow FLD 25 Working at Elevation/Fall Protection and FLD 26 Ladders.
- Test the gases exhausting from the vent pipe using a CGI/O2 meter. The CGI/O2 meter readings will be taken after inert gas has flowed into the tank for at least 10 minutes. Readings should be taken at various locations and levels inside the tank and at the vent point.
- CO2 fire extinguishers will not be used as a source of inert gas because the pressure is too high and the flow from the unit can produce static charges which are potential sources of ignition.

When inerting a tank using dry ice (frozen carbon dioxide [CO2]), 1.75 pounds of dry ice will be needed for every 100 gallons of tank capacity. The dry ice will be distributed evenly on the bottom of the tank. After placing of the dry ice, the tank must remain undisturbed for at least three hours until at least 80% of the dry ice has vaporized and the oxygen concentration is less than 8% before excavation work begins.

During tank inerting and subsequent removal from the ground, the conditions inside tank may change due to differences in temperature and movement below grade and in the air. Tank temperatures may change dramatically as a result of exposure to sunlight or even ambient air temperatures. As the temperature rises and the tank is moved, flammable gases may be released from the contaminants not yet cleaned from the tank surfaces, crevasses and scale.

The tank will be inerted when the concentration of O<sub>2</sub> < 8% or less than 50% of the minimum oxygen concentrations required to support combustion, whichever is less. CGI/O<sub>2</sub> readings at four elevations in the tank, minimum, and at an appropriate distance laterally from the opening as possible will be obtained to confirm the conditions in the tank.

### Hazards

- The presence of unexpected waste materials, such as waste solvents or gasoline, in the tank without the knowledge of the owner. These vapors can be an unexpected source of flammable or toxic vapors and exhausted during purging.
- Inhalation exposure to gasoline and other vapors released and exhausted during purging.
- Toxic and flammable vapors emanating from tank or surrounding soil.
- Static charges resulting from the flow of gases creating sparks, a source of ignition.
- Falls from ladders.
- Hazards presented by the inert environment and chemicals used to inert the space.
- Material handling and heavy equipment hazards.

### Controls

- Level D modified PPE at a minimum, including chemical protective gloves during tasks that present potential contact with tank contents, with changes to PPE based on the site conditions.
- Level B PPE will be used in the event that personnel must enter the tank interior. Prior to an entry, the procedures will be reviewed and approved by the DEHSM before being implemented.
- Confirming the tank configuration, including the locations where the inerting material will be added and where it will vent, and ensuring that vapors/gases will be safely vented during the task.
- Extending the height of the vent pipe, if necessary, so the vent line outlet is 12 feet above the grade and 3 feet above an adjacent roof.
- Eliminate sources of ignition from within at least 25 feet of the work area and vent exhaust.
- Electrically bonding the inert gas supply line to the tank fill line and grounding the gas supply.
- Continuously monitor the atmosphere in the tank and at tank openings and connections, particularly in low areas, with a CGI/O<sub>2</sub> meter. Any area where the LEL exceeds 10% will be ventilated to bring the LEL level below 10% before proceeding. Frequent checks of the O<sub>2</sub> calibration on the CGI/O<sub>2</sub> meter will be performed because the O<sub>2</sub> meter sensor is more rapidly worn out when exposed to carbon dioxide.
- Perform air monitoring using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.

- Follow Ladders FLD 26.
- Inerting will be performed by an experienced person and in accordance with the procedures provided by the equipment manufacturer or provider.
- Follow Heavy Equipment Operation FLD 22.
- Tank gases will be exhausted only through the vent pipe and after ensuring there are no sources of ignition within 25 feet of the tank or the vent pipe outlet.
- Place caution tape barrier or other appropriate barricades around excavation.
- Follow Utilities FLD 34.

#### **Excavation and Removal of the Tank**

After initial cleaning and flushing of the tank, the soil surrounding the tank can contain flammable and toxic materials. A tank which apparently last contained fuel oil may have previously contained gasoline or other toxic or flammable materials, and these materials may have leaked or spilled during tank filling operations. Gasoline can remain in subsoils for years. As a result, the removal of soil around a tank and the removal of the tank may expose soils contaminated with organic liquids that require it to be sampled and remediated.

The process to access a tank and to remove a tank requires the operation of heavy earth moving equipment to remove soil and heavy lifting equipment to move the tank. This equipment presents a hazard to personnel as they move and operate on the site and as an ignition source. The soils surrounding the tank may contain flammable materials. Low areas are of particular concern because of the potential for vapors to collect at these locations. When LEL readings exceed 20% in open areas, operations are to cease until the flammable vapors can be controlled.

Both the CGI and the PID/FID will be used to monitor the excavated soils. The CGI/O<sub>2</sub> results will be evaluated to ensure the concentrations of vapors/gases are less than 10% of the LEL and the PID/FID results will be evaluated with respect to the action levels. CGI/O<sub>2</sub> readings above 10% of the LEL will require cessation of work until these vapors can be controlled.

The tank will be kept in an upright position during handling and storage to avoid displacing the CO<sub>2</sub>. Before any subsequent work is done on the tank, the atmospheric conditions will be rechecked. The tank will be stabilized and secured when placed to prevent damage and movement. All potentially contaminated soils will be segregated and stockpiled in an appropriate manner, tested and properly disposed.

#### **Hazards**

- Heavy equipment hazards associated with soil excavation and rigging and lifting of the tank.
- Inhalation exposure to vapors emanating from tank or surrounding soil or skin contact with exposed liquid.
- Open excavation presenting a subsidence hazard and elevations presenting fall hazards.
- Underground utilities



### Controls

- Modified Level D PPE, as a minimum, upgrade if necessary.
- Follow Heavy Equipment Operation FLD 22.
- Continuously monitor the atmosphere in the tank and at tank openings and connections, particularly in low areas, with a CGI/O<sub>2</sub> meter. Any area where the LEL exceeds 10% will be ventilated to bring the LEL level below 10% before proceeding. Frequent checks of the O<sub>2</sub> calibration on the CGI/O<sub>2</sub> meter will be performed because the O<sub>2</sub> meter sensor is more rapidly worn out when exposed to carbon dioxide.
- Perform air monitoring using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.
- Place caution tape barrier or other appropriate barricades around excavation and follow the OSHA Standard for Excavations (29 CFR 1926; Subpart P; Excavation) and WESTON FLD 28, Excavating/Trenching.
- Follow Utilities FLD 34.

### Cutting Access Ports

Prior to cutting openings in the tank before final cleaning, atmospheric testing will be conducted to confirm that the internal atmosphere in the tank is at or below 10% of the LEL, either through purging or venting. If purging or venting can not maintain an atmosphere that is at or below 10% of the LEL, the tank shall be inerted.

If the cutting will involve the use of other tools or torches, then the DEHSM will approve the operation. Prior to cutting the oxygen content shall be at or below 23.5% and the LEL in the tank shall be 0%. During the course of the hot work, if the LEL rises to 10%, then all work will stop and will not continue until the LEL is again 0%.

Once conditions are acceptable, holes (at least 3 by 5 feet in size) will be cut in the ends of the tank using a pneumatic shear. In any cutting operation, the plate being removed shall be supported to prevent it from falling into the tank. The tank surface area near the cut must be kept cool during the cutting with a flow of water.

Once holes are cut in the tank, the interior of the tank will be ventilated using a blower. The blower and blower duct will be grounded and electrically bonded to the tank and will be intrinsically safe.

As indicated, intrinsically safe equipment will be used.

The tank will be monitored continuously during the blowing task and subsequent operations because flammable vapors may be released when residues in the tank are disturbed or heated. If at any time the LEL reading exceeds 10%, ventilate the tank until the LEL drops below 10%.

The area where air exhausts from the tank will be identified and posted to avoid entry by unauthorized personnel. Testing will be performed using the PID/FID to ensure that concentrations of toxics are maintained at a concentration less than one-half of the action level.

### Hazards

- Confined Space Hazards, including flammable and explosion hazards, and inert environments.
- Power and manual hand tools.
- Inhalation exposure and potential dermal contact with tank contents.
- Flammable vapors emanating from tank or surrounding soil.

### Controls

- Follow Confined Space Entry Program FLD 8.
- Follow Pressure Washers FLD 37.
- Follow Hand and Power Hand Tools FLD 38.
- Perform air monitoring using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.
- Continuously monitor the atmosphere in the tank and at tank openings and connections, particularly in low areas, with a CGI/O<sub>2</sub> meter. Any area where the LEL exceeds 10% will be ventilated to bring the LEL level below 10% before proceeding. Frequent checks of the O<sub>2</sub> calibration on the CGI/O<sub>2</sub> meter will be performed because the O<sub>2</sub> meter sensor is more rapidly worn out when exposed to carbon dioxide.
- Eliminate sources of ignition from at least 25 feet of the work area.

### Tank Final Cleaning and Cut-up for Disposal

Before disposal the tank must undergo a final cleaning inside and out, and cut up to ensure the tank will not be used again and/or facilitate transportation to disposal location. If the final cleaning involves entering the tank, the confined space entry will be completed in accordance the OSHA Standard (29 CFR 1910.146). When the CGI/O<sub>2</sub> indicates the reading is less than 10% of the LEL and the oxygen reading is >19.5 and < 22%, the tank may be entered for final cleaning using Level B PPE. The OSHA and Weston confined space entrance procedures will be followed during this work and approval for the work will be obtained from the DEHSM. An O<sub>2</sub> source will never be used to raise the O<sub>2</sub> level in the tank, only clean air will be used.

To clean the tank, holes can be cut in the ends of the tank to facilitate the tank cleaning activity and to minimize the difficulty of personnel getting into or out of the tank. A pneumatic shear or reciprocating saw will be used to cut these holes but hot work operating procedures will be followed and the interior of the tank ventilated with a blower and monitored with a CGI to ensure the absence of flammable vapors during this work.

The cleaning of interior tank interior surfaces will be completed using manual scraping, pressure washing, vacuum liquid handling equipment, manual wiping, or combination thereof. Removed tank contents (liquids, sludges) if not contained within the vacuum truck, will be placed in appropriate drums or containers and properly labeled. Any used PPE and wipe-down rags and absorbent pads will be handled in a similar manner.

After the tank has been cleaned, it may be cut up for disposal using shears, saws or cutting torch. The hot work operating practice will be followed during tank cutting including saw cutting. A tank out of the

ground will be subject to higher temperatures and additional vapors may be released from crevasses and recesses which may not be entirely cleaned. To ensure safety, continuous CGI/O2 monitoring will be performed. When cutting with a torch ensure that the LEL reading inside and out of the tank is less than 2% at all times.

#### Hazards

- Fire and explosion hazard from cutting activity.
- Confined Space entry and conditions in the space
- Noise from cutting
- Heavy equipment hazards associated with demolition and cutting of the tank.
- High pressure associated with the power washer hazards and the vacuum line suction vacuum line, if pressure washing is performed to clean the tank.

#### Controls

- Modified Level D, as a minimum, with upgrades in PPE based on results of air sampling and applicable action levels. Based on the contents of the tanks, for example leaded gasoline or other conditions, changes to the level of PPE may be required.
- Ventilate with blower.
- Follow Confined Space Entry Program FLD 8.
- Follow Occupational Noise and Hearing Conservation Program.
- Follow Heavy Equipment Operation FLD 22.
- Follow Pressure Washers FLD 37
- Vacuum liquid handling equipment must be equipped with a quick vacuum relief valve and this valve must be under the control of the confined space entrance spotter. This quick vacuum relief valve is needed to avoid potential injuries which could occur as a result of personnel being exposed to the powerful suction at the inlet to the vacuum line.
- Eliminate sources of ignition from at least 25 feet of the work area.
- Follow hot work procedures and keep LEL reading below 2% during torch cutting.

#### Soil Sampling

Soil sampling will be performed in accordance with all applicable regulations and guidance to confirm that all contaminated soil has been removed. Soil samples will be obtained from the bottom and sides of the excavation (see separate sampling plan) using a backhoe or other mechanical means. No one will enter the excavated area unless the excavation meets standards for sloping or shoring.

#### Hazards

- Excavation hazards, including subsidence and falls.
- Heavy Equipment hazards.
- Inhalation exposure to and contact with toxic chemicals.
- Equipment used in the collection and handling of soils.

### Controls

- Modified Level D, as a minimum, with upgrades in PPE based on results of air sampling and applicable action levels.
- Follow Excavating/Trenching FLD 28.
- Follow Heavy Equipment Operation FLD 22.
- Perform air monitoring using the appropriate sampling equipment, such as a FID or PID, and in accordance with the WESTON protocol for benzene (FLD 54). The results of monitoring will be evaluated with respect to established action levels to identify changes to PPE and respiratory protection requirements.

### Backfill Excavation with Clean Soil

Backfilling of the excavation will be performed in accordance with all applicable regulations and guidance. Clean soil will be placed into the excavation using earth moving equipment. Where possible, compaction of backfill soil will be done remotely using, for example, the excavator bucket to compress the soil in lifts. Personnel will not enter excavation unless protected from cave-in and other trench hazards.

### Hazards

- Heavy equipment hazard.

### Controls

- Modified Level D PPE.
- Follow Heavy Equipment FLD 22.

## **RST 2 FLD 43A      ANIMALS**

Animals represent hazards because of their poisons or venoms, size and aggressiveness, diseases transmitted, or the insects they may carry.

### **Feral Animals**

Landfills and abandoned buildings often attract stray or abandoned dogs. These animals often become pack-oriented, very aggressive, and represent serious risk of harm to unprotected workers.

Workers entering abandoned buildings should be alert for such animals and avoid approaching them since this may provoke aggressive behavior. Avoidance and protection protocols include watching for animal dens, using good housekeeping, and using repellents.

### **Dangerous Wild Animals**

Work in remote areas inhabited by wild animals that have been known to cause injury and kill human beings, requires that companies working in these areas carefully plan for wildlife encounters. This FLD outlines actions that, when properly implemented, should provide a high degree of protection for WESTON employees and wildlife.

See Wildlife Hazard Recognition and Protection Procedure (Attached).

### **Venomous Snakes and Lizards**

#### **Venomous Snakes**

Venomous snakes are common around the world. The major variables are the likelihood of encounter and the snake that is likely to be encountered. Encounters with snakes may be caused by moving containers, reaching into holes, or just walking through high grass, swampy areas, or rocks. **Do not attempt to catch any snakes.**

Symptom of venomous snake bites:

- Bloody wound discharge, blurred vision, burning, convulsions, diarrhea, dizziness, excessive sweating, fainting, fang marks in the skin, fever, increased thirst, local tissue death, loss of muscle coordination, nausea and vomiting, numbness and tingling, rapid pulse, severe pain, skin discoloration, swelling at the site of the bite, weakness.

Venom from venomous snakes and lizards can be divided into three types of toxins, however, there are some indications that snake venom may have more than one toxin and characteristics may change as a snake ages. The three types of toxins and their effects are:



**Hemotoxins** destroy blood cells and affect the circulatory system. The site of the bite rapidly becomes swollen, discolored, and painful. This is usually accompanied by swelling, discoloration, and pain progressing toward the heart.

**Neurotoxins** affect the nervous system and symptoms vary from foggy vision, dizziness, and other comparatively mild symptoms to rigid or flaccid paralysis, shortness of breath, weakness or paralysis of the lower limbs, double vision, inability to speak or swallow, drooping eyelids, and involuntary tremors of the facial muscles. Death can occur in as little as ten minutes, usually due to abrupt cessation of respiration.

**Myotoxins** destroy cells and cause muscle necrosis.

In the US, with the exception of the coral snakes which tend to have neuron-toxic venom, most venomous snakes have been categorized as having hemotoxic venom (in some areas Mojave rattlesnakes are found to have neuron-toxic venom). There is some indication that some species of rattlesnakes have both hemotoxic and neuron-toxic venom. It is also reported that venom of younger snakes may be more neuron-toxic.

There are many highly venomous snakes worldwide, some are deadly and most can be deadly without proper care.

### **Geographical Listing of Venomous Snakes**

Following is a list of poisonous snakes by geographic area. This list is extensive but may not be all inclusive. In planning for work around the world, also contact local agencies to determine whether there may be additional venomous snakes or lizards.

#### **North America**

**Copperheads** (Broad-banded, Northern, Osage, Southern, Trans-Pecos)

**Rattlesnakes** Diamondback (eastern and western), Massasauga (eastern and western)

**Cottonmouth or water moccasin** (Eastern)

### **Prevention of Bites**

Key factors to working safely in areas where snakes or lizards may be encountered include:

- Be alert
- Use care when reaching into or moving containers
- Use sticks or long-handled tools when reaching where you cannot see
- Be familiar with the habits and habitats of snakes in the vicinity of an incident or site
- In areas or activities where encounters with snakes are likely, wear sturdy leather or rubber work boots and snake chaps
- Do not attempt to catch snakes unless required and qualified

A snake bite warrants medical attention after administration of proper first-aid procedures. It is important to contact local medical facilities to determine where anti-venoms are located.

## **First-Aid**

1. Keep the person calm. Restrict movement, and keep the affected area below heart level to reduce the flow of venom.
2. Remove any rings or constricting items because the affected area may swell. Create a loose splint to help restrict movement of the area.
3. If the area of the bite begins to swell and change color, the snake was probably venomous.
4. Monitor the person's vital signs -- temperature, pulse, rate of breathing, and blood pressure if possible. If there are signs of shock (such as paleness), lay the person flat, raise the feet about a foot, and cover the person with a blanket.
5. Get medical help immediately.
6. Try to photograph or identify the snake. Do not waste time hunting for the snake, and do not risk another bite. Be careful of the head of a dead snake. A snake can actually bite for up to an hour after it is dead (from a reflex).
  - DO NOT allow the person to become over-exerted. If necessary, carry the person to safety.
  - DO NOT apply a tourniquet.
  - DO NOT apply cold compresses to a snake bite.
  - DO NOT cut into a snake bite with a knife or razor.
  - DO NOT try to suction the venom by mouth.
  - DO NOT give stimulants or pain medications unless instructed to do so by a doctor.
  - DO NOT give the person anything by mouth.
  - DO NOT raise the site of the bite above the level of the person's heart
  - Transport the victim to medical attention immediately

## **Animal Borne Diseases**

### **Rabies**

Animal borne diseases include rabies (generally found in dogs, skunks, raccoons, bats, and foxes). Rabies varies from area to area as do the animals most likely to be rabid.

### **Questions and Answers about Rabies**

*Q. What is Rabies and how is it transmitted?*

A. Rabies is a viral infection most often transmitted by bites of animals infected with the virus.

*Q. What animals are most likely to be infected?*

A. Skunks, raccoons, foxes, and bats are wild animals most frequently found to be infected with rabies; however, any warm blooded animal can be infected. Squirrels, groundhogs, horses, cattle, and rabbits have been tested positive for rabies. Dogs and cats are frequently rabies-infected if not immunized.

*Q. How can you tell if an animal is rabies-infected?*

A. Rabies infection is not always apparent. Signs to look for in wild animals are over-aggressiveness or passivity. Spotting animals which are normally nocturnal (active at night) during the day and being able to approach them would be an example of unusual behavior. Finding a bat alive and on the ground is abnormal. The best precaution, however, is to observe wild animals from a safe distance, even if they are injured. Avoid dogs and cats that you do not know.

*Q. What should you do if bitten by an animal you suspect is infected with rabies?*

A. As quickly as possible, wash the bite area with soap and water, then disinfect with 70% alcohol and seek medical attention for follow-up. Try to capture the animal. Avoid being bitten again or contacting the mouth or any saliva of the animal. Keep the animal under surveillance and call the police for assistance to capture it. Have the animal tested.

A dead animal believed to be infected should be preserved and tested for rabies. Health departments are often sources where information can be found regarding testing.

*Q. Is there a cure for rabies?*

A. Rabies is preventable, even after being bitten, if treatment is begun soon enough. Getting prompt medical attention and confirming the rabies infection of an animal are very important. **Rabies is not curable once symptoms or signs of rabies appear.**

There are vaccines available that should be considered if a work assignment involves trapping animals likely to carry rabies. Medical consultants must be involved in decisions to immunize workers against rabies.

### **Hantavirus**

WESTON employees or contractors/subcontractors conducting field work in areas where there is evidence of a rodent population should be aware of an increased level of concern regarding the transmission of "Hantavirus"-associated diseases. Hantavirus is associated with rodents, especially the deer mouse (*Peromyscus manicularis*) as a primary reservoir host. Hantavirus has resulted in several deaths in the U.S.

The Hantavirus can be transmitted by infected rodents through their saliva, urine, and feces. Human infection may occur when infected wastes are inhaled as a result of aerosols produced directly from the animals. They also may come from dried materials introduced into broken skin or onto mucous membranes. Infections in humans occur most in adults and are associated with

activities that provide contact with infected rodents in rural/semi-rural areas. Hantavirus begins with one or more flu-like symptoms (i.e., fever, muscle aches, headache, and/or cough) and progresses rapidly to severe lung disease. Early diagnosis and treatment are vital.

### **Prevention**

Personnel involved in work areas where rodents and the presence of the Hantavirus are known or suspected will need to take personal protective measures and to develop an expanded site safety plan.

Field personnel involved in trapping or contacting rodents or their waste products will need to wear respirators with high-efficiency particulate air (HEPA) filters, eye protection, Tyvek coveralls, chemical-resistant gloves, and disposable boot covers. Strict decontamination requirements are needed. Double-bag, label, and specific handling, packaging, shipping, storage, and analytical procedures are required to minimize the risks of exposure from collected mice. More detailed procedures can be obtained from WESTON Corporate Health and Safety.

For employees and facilities in rural/semi-rural areas, the following risk-reduction strategies are appropriate:

- Eliminate rodents and reduce availability of food sources and nesting sites used by rodents.
- Store trash/garbage in rodent-proof metal or thick plastic containers with tight lids.
- Cut all grass/underbrush in proximity to buildings.
- Prevent rodents from entering buildings (e.g., use steel wool, screen, etc., to eliminate openings).

### **Plague**

Described under Insects (Fleas)

### **Anthrax**

Anthrax is an acute infectious disease caused by the spore-forming bacterium *Bacillus anthracis*. Anthrax most commonly occurs in wild and domestic lower vertebrates (cattle, sheep, goats, and other herbivores), but it can also occur in humans when they are exposed to infected animals or tissue from infected animals.

Anthrax is most common in agricultural regions where it occurs in animals. When anthrax affects humans, it is usually due to an occupational exposure to infected animals or their products. Workers who are exposed to dead animals and animal products from other countries where anthrax is more common may become infected with *B. anthracis* (industrial anthrax). Anthrax in wild livestock has occurred in the U.S.

Anthrax infection can occur in three forms: cutaneous (skin), inhalation, and gastrointestinal. *B. anthracis* spores can live in the soil for many years, and humans can become infected with anthrax by handling products from infected animals or by inhaling anthrax spores from contaminated animal products. Anthrax can also be spread by eating undercooked meat from infected animals. It is rare to find infected animals in the U.S.

**Cutaneous:** Most (about 95%) anthrax infections occur when the bacterium enters a cut or abrasion on the skin, such as when handling contaminated wool, hides, leather, or hair products (especially goat hair) of infected animals. Skin infection begins as a raised itchy bump that resembles an insect bite but within 1-2 days develops into a vesicle and then a painless ulcer, usually 1-3 cm in diameter, with a characteristic black necrotic (dying) area in the center. Lymph glands in the adjacent area may swell. About 20% of untreated cases of cutaneous anthrax will result in death. Deaths are rare with appropriate antimicrobial therapy.

**Inhalation:** Initial symptoms may resemble a common cold. After several days, the symptoms may progress to severe breathing problems and shock. Inhalation anthrax is usually fatal.

**Intestinal:** The intestinal disease form of anthrax may follow the consumption of contaminated meat and is characterized by an acute inflammation of the intestinal tract. Initial signs of nausea, loss of appetite, vomiting, and fever are followed by abdominal pain, vomiting of blood, and severe diarrhea. Intestinal anthrax results in death in 25% to 60% of cases.

Anthrax is not known to spread from one person to another person. Communicability is not a concern in managing or visiting patients with inhalation anthrax.

## **Prevention**

In countries where anthrax is common and vaccination levels of animal herds are low, humans should avoid contact with livestock and animal products and avoid eating meat that has not been properly slaughtered and cooked. Also, an anthrax vaccine has been licensed for use in humans. The vaccine is reported to be 93% effective in protecting against anthrax.

Doctors can prescribe effective antibiotics. To be effective, treatment should be initiated early. If left untreated, the disease can be fatal.

Direct person-to-person spread of anthrax is extremely unlikely; however, a patient's clothing and body may be contaminated with anthrax spores. Effective decontamination of people can be accomplished by a thorough wash down with anti-microbe effective soap and water. Waste water should be treated with bleach or other anti-microbial agent. Effective decontamination of articles can be accomplished by boiling contaminated articles in water for 30 minutes or longer and using common disinfectants. Chlorine is effective in destroying spores and vegetative cells on surfaces. Burning the clothing is also effective. After decontamination, there is no need to immunize, treat, or isolate contacts of people ill with anthrax unless they also were also exposed to the same source of infection. Early antibiotic treatment of anthrax is essential—delay seriously lessens chances for survival. Treatment for anthrax infection and other bacterial infections



includes large doses of intravenous and oral antibiotics, such as fluoroquinolones, like ciprofloxacin (cipro), doxycycline, erythromycin, vancomycin, or penicillin. In possible cases of inhalation anthrax exposure to unvaccinated personnel, early antibiotic prophylaxis treatment is crucial to prevent possible death.

No skin, especially if it has any wounds or scratches, should be exposed. Disposable personal protective equipment is preferable, but if not available, decontamination can be achieved by washing any exposed equipment in hot water, bleach and detergent. Disposable personal protective equipment and filters should be burned and buried. The size of *Bacillus anthracis* bacilli ranges from 0.5  $\mu\text{m}$  to 5.0  $\mu\text{m}$ . Anyone working with anthrax in a suspected or confirmed victim should wear respiratory equipment capable of filtering this size of particle or smaller. The U.S. National Institute for Occupational Safety and Health (NIOSH) and Mine Safety and Health Administration (MSHA) approved high efficiency-respirator, such as a half-face disposable respirator with a HEPA filter, is recommended. All possibly contaminated bedding or clothing should be isolated in double plastic bags and treated as possible bio-hazard waste. Dead victims that are opened and not burned provide an ideal source of anthrax spores; the victim should be sealed in an airtight body bag. Cremating victims is the preferred way of handling body disposal. No embalming or autopsy should be attempted without a fully equipped biohazard lab and trained and knowledgeable personnel.

Delays of only a few days may make the disease untreatable and treatment should be started even without symptoms if possible contamination or exposure is suspected. Animals with anthrax often just die without any apparent symptoms. Initial symptoms may resemble a common cold – sore throat, mild fever, muscle aches and malaise. After a few days, the symptoms may progress to severe breathing problems and shock and ultimately death. Death can occur from about two days to a month after exposure with deaths apparently peaking at about 8 days after exposure. <sup>[8]</sup> Antibiotic-resistant strains of anthrax are known.

Aerial spores can be trapped by a simple HEPA or P100 filter. Inhalation of anthrax spores can be prevented with a full-face mask using appropriate filtration. Unbroken skin can be decontaminated by washing with simple soap and water. All of these procedures do not kill the spores which are very hard to kill and require extensive treatment to eradicate them. Filters, clothes, etc. exposed to possible anthrax contaminated environments should be treated with chemicals or destroyed by fire to minimize the possibility of spreading the contamination.

In recent years there have been many attempts to develop new drugs against anthrax, but the existing supply still works fine if treatment is started soon enough.

Prevention can also be accomplished through early detection. In response to the U.S. Postal Service (USPS) anthrax attacks of October 2001, the USPS has installed BioDetection Systems (BDS) in their large-scale mail cancellation facilities. BDS response plans have been formulated by the USPS in conjunction with local responders including fire, police, hospitals, and public health. Employees of these facilities have been educated about anthrax, response actions and prophylactic medication. Because of the time delay inherent in getting final verification that anthrax has been used, prophylactic antibiotics for possibly exposed personnel should commence as soon as possible.

The ultimate in prevention is vaccination against infection but this has to be done well in advance of exposure.

Anthrax spores can survive for long periods of time in the environment after release. Methods for cleaning anthrax contaminated sites commonly use oxidizing agents such as peroxides, ethylene Oxide, Sandia Foam, chlorine dioxide (used in the Hart Senate office building), and liquid bleach products containing sodium hypochlorite. These agents slowly destroy bacterial spores. A bleach solution for treating hard surfaces has been approved by the EPA and can be prepared by mixing one part bleach (5.25%-6.00%) to one part white vinegar to eight parts water. Bleach and vinegar must not be combined together directly, rather some water must first be added to the bleach (e.g., two cups water to one cup of bleach), then vinegar (e.g., one cup), and then the rest of the water (e.g., six cups). The pH of the solution should be tested with a paper test strip; and treated surfaces must remain in contact with the bleach solution for 60 minutes (repeated applications will be necessary to keep the surfaces wet).

Chlorine dioxide has emerged as the preferred biocide against anthrax-contaminated sites, having been employed in the treatment of numerous government buildings over the past decade. Its chief drawback is the need for in situ processes to have the reactant on demand.

To speed the process, trace amounts of a non-toxic catalyst composed of iron and tetra-amido macrocyclic ligands are combined with sodium carbonate and bicarbonate and converted into a spray. The spray formula is applied to an infested area and is followed by another spray containing tertiary-butyl hydroperoxide.

Using the catalyst method, a complete destruction of all anthrax spores takes 30 minutes. A standard catalyst-free spray destroys fewer than half the spores in the same amount of time. They can be heated, exposed to the harshest chemicals, and they do not easily die.

### **Brucellosis**

Brucellosis, also called undulant fever or Malta fever, is a zoonosis (infectious disease transmitted from animals to humans) caused by bacteria of the genus *Brucella*. It is primarily a disease of domestic animals (goats, pigs, cattle, dogs, etc.) and humans and has a worldwide distribution.

Although brucellosis can be found worldwide, it is more common in countries that do not have good standardized and effective public health and domestic animal health programs. Areas currently listed as high risk include the Caribbean.

The disease is transmitted either through contaminated or untreated milk (and its derivatives) or through direct contact with infected animals, which may include dogs, pigs, camels, and ruminants, primarily sheep, goats, cattle, and bison. This also includes contact with their carcasses.

Leftovers from parturition are also extremely rich in highly virulent brucellae. Brucellae, along with leptospira have the unique property of being able to penetrate through intact human skin, so infection by mere hand contact with infectious material is likely to occur.

The disease is now usually associated with the consumption of un-pasteurized milk and soft cheeses made from the milk of infected animals and with occupational exposure of veterinarians and slaughterhouse workers. Some vaccines used in livestock, most notably *B. abortus* strain 19 also cause disease in humans if accidentally injected. Problems with vaccine induced cases in the United States declined after the release of the RB-51 strain developed in the 1990s and the relaxation of laws requiring vaccination of cattle in many states.

The incubation period of brucellosis is, usually, of one to three weeks, but some rare instances may take several months to surface.

Brucellosis induces inconstant fevers, sweating, weakness, anemia, headaches, depression and muscular and bodily pain.

The symptoms are like those associated with many other febrile diseases, but with emphasis on muscular pain and sweating. The duration of the disease can vary from a few weeks to many months or even years. In first stage of the disease, septicaemia occurs and leads to the classic triad of undulant fevers, sweating (often with characteristic smell, likened to wet hay) and migratory arthralgia and myalgia.

### **Prevention**

The main way of preventing brucellosis is by using fastidious hygiene in producing raw milk products, or by pasteurization of all milk that is to be ingested by human beings, either in its pure form or as a derivate, such as cheese.

Provide protection from skin contact when handling potentially infected animals.

### **Q fever**

**Q fever** is caused by infection with *Coxiella burnetii*. This organism is uncommon but may be found in cattle, sheep, goats and other domestic mammals, including cats and dogs. The infection results from inhalation of contaminated particles in the air, and from contact with the vaginal mucus, milk, feces, urine or semen of infected animals. The incubation period is 9-40 days. It is considered possibly the most infectious disease in the world, as a human being can be infected by a single bacterium.

The most common manifestation is flu-like symptoms with abrupt onset of fever, malaise, profuse perspiration, severe headache, myalgia (muscle pain), joint pain, loss of appetite, upper respiratory problems, dry cough, pleuritic pain, chills, confusion and gastro-intestinal symptoms such as nausea, vomiting and diarrhea. The fever lasts approximately 7-14 days.

During the course, the disease can progress to an atypical pneumonia, which can result in a life threatening acute respiratory distress syndrome (ARDS), whereby such symptoms usually occur during the first 4-5 days of infection.

Less often the Q fever causes (granulomatous) hepatitis which becomes symptomatic with malaise, fever, liver enlargement (hepatomegaly), pain in the right upper quadrant of the abdomen and jaundice (icterus).

The chronic form of the Q fever is virtually identical with the inflammation of the inner lining of the heart (endocarditis), which can occur after months or decades following the infection. It is usually deadly if untreated. However, with appropriate treatment this lethality is around 10%.

The common way of infection is inhalation of contaminated dust, contact with contaminated milk, meat, wool and particularly birthing products. Ticks can transfer the pathogenic agent to other animals. Transfer between humans seems extremely rare and has so far been described in very few cases.

### **Prevention**

Q fever is effectively prevented by intradermal vaccination with a vaccine composed of killed *Coxiella burnetii* organisms. Skin and blood tests should be done before vaccination to identify preexisting immunity; the reason is that vaccinating subjects who already have immunity can result in a severe local reaction. After a single dose of vaccine, protective immunity lasts for many years. Revaccination is not generally required. Annual screening is typically recommended.

Wear appropriate PPE when handling potentially infected animals or materials.

### **Leptospirosis**

Leptospirosis is a bacterial disease that affects humans and animals. It is caused by bacteria of the genus *Leptospira*.

The time between a person's exposure to a contaminated source and becoming sick is 2 days to 4 weeks. Illness usually begins abruptly with fever and other symptoms. Leptospirosis may occur in two phases; after the first phase, with fever, chills, headache, muscle aches, vomiting, or diarrhea, the patient may recover for a time but become ill again. If a second phase occurs, it is more severe; the person may have kidney or liver failure or meningitis. This phase is also called Weil's disease.

The illness lasts from a few days to 3 weeks or longer. Without treatment, recovery may take several months. In rare cases death occurs.

Many of these symptoms can be mistaken for other diseases. Leptospirosis is confirmed by laboratory testing of a blood or urine sample.

*Leptospira* organisms have been found in cattle, pigs, horses, dogs, rodents, and wild animals. Humans become infected through contact with water, food, or soil containing waste from these infected animals. This may happen by consuming contaminated food or water or through skin contact, especially with mucosal surfaces, such as the eyes or nose, or with broken skin. The disease is not known to be spread from person to person.

Leptospirosis occurs worldwide but is most common in temperate or tropical climates. It is an occupational hazard for many people who work outdoors or with animals, for example, farmers, sewer workers, veterinarians, fish workers, dairy farmers, or military personnel. It is a recreational hazard for campers or those who participate in outdoor sports in contaminated areas and has been associated with swimming, wading, and whitewater rafting in contaminated lakes and rivers. The incidence is also increasing among urban children.

The risk of acquiring leptospirosis can be greatly reduced by not swimming or wading in water that might be contaminated with animal urine.

Protective clothing or footwear should be worn by those exposed to contaminated water or soil because of their job or recreational activities.

### **Prevention**

Avoid risky foods and drinks.

Buy it bottled or bring it to a rolling boil for 1 minute before drink it. Bottled carbonated water is safer than non-carbonated water.

Ask for drinks without ice unless the ice is made from bottled or boiled water. Avoid popsicles and flavored ices that may have been made with contaminated water.

Eat foods that have been thoroughly cooked and that are still hot and steaming

Avoid raw vegetables and fruits that cannot be peeled. Vegetables like lettuce are easily contaminated and are very hard to wash well. When eating raw fruit or vegetables that can be peeled, peel them yourself. (Wash your hands with soap first.) Do not eat the peelings.

Avoid foods and beverages from street vendors. It is difficult for food to be kept clean on the street, and many travelers get sick from food bought from street vendors.

Leptospirosis is treated with antibiotics, such as doxycycline or penicillin, which should be given early in the course of the disease. Intravenous antibiotics may be required for persons with more severe symptoms. Persons with symptoms suggestive of leptospirosis should contact a health care provider.



## **Ebola**

Ebola is both the common term used to describe a group of viruses belonging to genus *Ebolavirus*, family *Filoviridae*, and the common name for the disease which they cause, Ebola hemorrhagic fever. Ebola viruses are morphologically similar to the Marburg virus, also in the family *Filoviridae*, and share similar disease symptoms. Ebola has caused a number of serious and highly publicized outbreaks since its discovery.

Despite considerable effort by the World Health Organization, no animal reservoir capable of sustaining the virus between outbreaks has been identified. However, it has been hypothesized that the most likely candidate is the fruit bat.

Ebola hemorrhagic fever is potentially lethal and encompasses a range of symptoms including fever, vomiting, diarrhea, generalized pain or malaise, and sometimes internal and external bleeding. Mortality rates are extremely high, with the human case-fatality rate ranging from 50% - 89%, according to viral subtype.<sup>[2]</sup> The cause of death is usually due to hypovolemic shock or organ failure.

Because Ebola is potentially lethal and since no approved vaccine or treatment is available, Ebola is classified as a biosafety level 4 agent, as well as a Category A bioterrorism agent by the Centers for Disease Control and Prevention.

Symptoms are varied and often appear suddenly. Initial symptoms include high fever (at least 38.8°C), severe headache, muscle joint, or abdominal pain, severe weakness and exhaustion, sore throat, nausea, and dizziness. Before an outbreak is suspected, these early symptoms are easily mistaken for malaria, typhoid fever, dysentery, influenza, or various bacterial infections, which are all far more common and less reliably fatal.

Ebola may progress to cause more serious symptoms, such as diarrhea, dark or bloody feces, vomiting blood, red eyes due to distention and hemorrhage of sclerotic arterioles, petechia, maculopapular rash, and purpura. Other secondary symptoms include hypotension (less than 90 mm Hg systolic /60 mm Hg diastolic), hypovolemia, tachycardia, organ damage (especially the kidneys, spleen, and liver) as a result of disseminated systemic necrosis, and proteinuria. The interior bleeding is caused by a chemical reaction between the virus and the platelets which creates a chemical that will cut cell sized holes into the capillary walls.

Among humans, the virus is transmitted by direct contact with infected body fluids, or to a lesser extent, skin or mucus membrane contact. The incubation period can be anywhere from 2 to 21 days, but is generally between 5 and 10 days.

Although airborne transmission between monkeys has been demonstrated by an accidental outbreak in a laboratory located in Virginia, USA, there is very limited evidence for human-to-human airborne transmission in any reported epidemics.

The infection of human cases with Ebola virus has been documented through the handling of infected chimpanzees, and gorillas--both dead and alive.

So far, all epidemics of Ebola have occurred in sub-optimal hospital conditions, where practices of basic hygiene and sanitation are often either luxuries or unknown to caretakers and where disposable needles and autoclaves are unavailable or too expensive. In modern hospitals with disposable needles and knowledge of basic hygiene and barrier nursing techniques, Ebola rarely spreads on such a large scale.

### **Prevention**

Prevention methods include good hygiene in medical settings and awareness of the virus in travel areas. There is no known effective vaccine for humans.

Prevention efforts should concentrate on avoiding contact with host or vector species. Travelers should not visit locations where an outbreak is occurring. Contact with rodents should be avoided. Minimize exposure to arthropod bites by using permethrin-impregnated bed nets and insect repellents.

Strict compliance with infection control precautions (i.e., use of disposable gloves, face shields, and disposable gowns to prevent direct contact with body fluids and splashes to mucous membranes when caring for patients or handling clinical specimens; appropriate use and disposal of sharp instruments; hand washing and use of disinfectants) is recommended to avoid health care-associated infections.

Contact with dead primates should be avoided.

### **Bird and Bat Borne or Enhanced Diseases**

**See also under Molds and Fungus**

### **Histoplasmosis**

Histoplasmosis is a fungal infection which enters the body through the lungs. The infection enters the body through the lungs. The fungus grows as a mold in the soil, and infection results from breathing in airborne particles. Soil contaminated with bird or bat droppings are known to have a higher concentration of histoplasmosis.

There may be a short period of active infection, or it can become chronic and spread throughout the body. Most people who do develop symptoms will have a flu-like syndrome (acute-fever, chills cough, and chest pain; chronic-chest pain, cough with blood, fever, shortness of breath, sweating) and lung complaints related to pneumonia or other lung involvement. Approximately 10% of the population will develop inflammation in response to the initial infection. This can effect the skin, bones or joints, or the lining of the heart (pericardium). These symptoms are not due to fungal infection of those body parts, but due to inflammation.

In a small number of patients, histoplasmosis may become widespread (disseminated) in involve the blood, brain, adrenal glands, or other organs. Very young or old are at a higher risk for

disseminated histoplasmosis. Symptoms include fevers, headache, neck stiffness, mouth sores, skin lesions.

Histoplasmosis may be prevented by reducing dust exposure in areas containing bird or bat droppings. Wear PPE and respirator when working within this environment. Institute work practices and dust control measures, i.e. moist/wet area, that eliminate or reduce dust generation which will reduce risks of infection and subsequent development of disease.

#### **Treatment**

The main treatment for histoplasmosis is antifungal drugs. Amphotericin B, itraconazole, and ketoconazole are the usual treatments. Long-term treatment with antifungal drugs may be needed.

#### **Psittacosis**

Psittacosis is a disease caused by a bacteria that is found in bird droppings and other secretions (often carried by pet birds). The bacteria is found worldwide.

Symptoms of psittacosis infection may include a low-grade fever that often becomes worse as the disease progresses, including anorexia, sore throat, light sensitivity, and a severe headache.

Ammonia and sodium hypochlorite based disinfectants are effective disinfectants for Psittacosis.

Where it is necessary to remove bat droppings from buildings prior to renovation or demolition it is prudent to assume infection and use the following precautions:

- Avoid areas that may harbor the bacteria, e.g., accumulations of bird or bat droppings.
- Areas known or suspected of being contaminated by *the organisms causing* Psittacosis such as bird roosts, attics, or even entire buildings that contain accumulations of bat or bird manure, should be posted with signs warning of the health risk. The building or area should be secured
- Before an activity is started that may disturb any material that might be contaminated by Psittacosis, workers should be informed in writing of the personal risk factors that increase an individual's chances of developing these diseases. Such a written communication should include a warning that individuals with weakened immune systems are at the greatest risk of developing severe forms of these diseases become infected. These people should seek advice from their health care provider about whether they should avoid exposure to materials that might be contaminated with these organisms.

The best way to prevent exposure is to avoid situations where material that might be contaminated can become aerosolized and subsequently inhaled. A brief inhalation exposure to

highly contaminated dust may be all that is needed to cause infection and subsequent development of psittacosis. Therefore, work practices and dust control measures that eliminate or reduce dust generation during the removal of bat manure from a building will also reduce risks of infection and subsequent development of disease. For example, instead of shoveling or sweeping dry, dusty material, carefully wetting it with a water spray can reduce the amount of dust aerosolized during an activity. Adding a surfactant or wetting agent to the water might reduce further the amount of aerosolized dust.

Once the material is wetted, it can be collected in double, heavy-duty plastic bags, a 55-gallon drum, or some other secure container for immediate disposal. An alternative method is use of an industrial vacuum cleaner with a high-efficiency filter to *bag* contaminated material. Truck-mounted or trailer-mounted vacuum systems are recommended for buildings with large accumulations of bat or bird manure. These high-volume systems can remove tons of contaminated material in a short period. Using long, large-diameter hoses, such a system can also remove contaminated material located several stories above its waste hopper. This advantage eliminates the risk of dust exposure that can happen when bags tear accidentally or containers break during their transfer to the ground.

The removal of all material that might be contaminated from a building and immediate waste disposal will eliminate any further risk that someone might be exposed to aerosolized spores. Air sampling, surface sampling, or the use of any other method intended to confirm that no infectious agents remain following removal of bat manure is unnecessary in most cases. However, before a removal activity is considered finished, the cleaned area should be inspected visually to ensure that no residual dust or debris remains.

Spraying 1:10 bleach to water mixture on droppings and allowing it to dry is also a recommended practice for the psittacosis organisms.

Because work practices and dust control measures to reduce worker exposures to these organisms have not been fully evaluated, using personal protective equipment is still necessary during some activities. During removal of an accumulation of bat or bird manure from an enclosed area such as an attic, dust control measures should be used, but wearing a NIOSH-approved respirator and other items of personal protective equipment is also recommended to reduce further the risk of exposure to the organisms that cause Psittacosis.

#### Treatment

Psittacosis is often hard to diagnoses and while a concern, it does not occur with great frequency. Knowledge of the symptoms and of potential exposure is important when seeking medical follow-up for potential exposure.

There are various medical treatments for psittacosis based on extent of infection. The sooner the disease is diagnosed and treatment is begun the more effective the treatment will be.

## **APPENDIX A**

### **Dangerous Animals - Wildlife Hazard Recognition and Protection**

#### **GENERAL**

Work in remote areas inhabited by wild animals that have been known to cause injury and kill human beings, requires that companies working in these areas carefully plan for wildlife encounters. This procedure outlines actions that when properly implemented should provide a high degree of protection for employees and wildlife.

These procedures apply to employees who prepare Health and Safety Plans or perform fieldwork in environments in which wild animals may be encountered. However, due to the unpredictable nature of wild animals this single document cannot possibly cover all potential risks or protective measures. Therefore, prior to entering remote areas inhabited by dangerous wildlife, contact local wildlife agencies to gather additional information concerning local risks and protective measures.

#### **ATTACHMENTS**

Attachments 1 and 2 outline behavioral characteristics of and outline controls that will minimize human injury, loss of property, and unnecessary destruction of wildlife, while ensuring a safe work environment.

#### **WILDLIFE AVOIDANCE AND BASIC PROTECTIVE MEASURES**

The best protective measure is simply avoidance. Large numbers of humans present deterrence to wild animals; therefore, whenever possible teams in the field should work together in groups of four or more. Whenever practical, fieldwork should be scheduled around the seasonal cycles of wildlife in the area. When wild animal avoidance cannot be achieved through scheduling, personnel involved in field activities in which encounters with wild animals may result, will take the following steps and will be equipped and trained, as set forth below.

#### **CLEAR THE AREA**

Evaluate and control the area before entry by

- Determine areas of recent sightings through local Fish and Game, state troopers, etc.;
- Conduct a site observation from an off-site elevated point, if possible;
- Conduct a controlled walk through in the area by a trained observer;
- Arrange a briefing by a local specialist, e. g., Fish and Game, etc.; and
- Utilizing appropriate noisemakers.

#### **BASIC EQUIPMENT**

Employees entering an environment where encounters with wild animals are possible should be provided, as a minimum:

- Noisemakers, such as air horns, bells, etc.; and
- Bear spray of not less than 16-ounce capacity (with holster), equivalent to capicum pepper (red pepper extract), which is capable of spraying at least 15 feet. (Notes: Normally cannot be transported in side aircraft passenger compartments and may be



considered a hazardous material, check with airlines and hazardous material shippers for current information).

### **TRAINING**

Prior to entering and / or working in areas inhabited by dangerous wildlife each employee should receive training as outlined in this procedure. At a minimum, training must include information related to:

- Wildlife present, habitat, behavior patterns, including when wild animals are most active, etc.
- Warning signs, such as tracks, bedding areas, scat, claw marks, offspring, paths, etc.,
- Avoidance measures
- Other hazards, precautions, and protective measures as outlined in the Attachments,
- (At the jobsite) spray demonstration and safety instructions which include location of and persons designated as "bear watch"

An outline of the training content should be reviewed and approved by the Divisional EHS manager and should be documented. A record of the training will be maintained at the job site, filed with the SSHSP and in the employee's training records.

### **VEHICLE SAFETY**

Use extreme caution, particularly in darkness, when operating vehicles in areas where wild animals may be present. Collisions with large animals have been known to cause significant property damage and personal injuries to vehicle passengers, including fatalities.

## **ATTACHMENT 1**

### **BEAR SAFETY – HAZARD RECOGNITION AND PRECAUTIONS**

On occasion fieldwork may be conducted in a location where bears may be encountered. The following technical information, precautions, and guidelines for operations in which bears could be encountered are based on experience and conditions for field work. Bears are intelligent, wild animals and are potentially dangerous, and would rather be left alone. The more bears are understood the less they will be feared. This attachment is intended to provide information that will enable Weston to plan for bear encounters and to properly address face-to-face encounters.

### **Bear Life History**

Although bears are creatures of habit, they are also intelligent, and each has its own personality. The way a bear reacts is often dictated by what it has learned from its mother, the experience it has had on its own, and the instincts nature has provided. Like other intelligent animals, we can make general statements about bears, but few people can accurately predict their behavior.

Bears have an incredible sense of smell, and seem to trust it more than any other sense. Hearing and sight are also important, but to a lesser degree. A bear's hearing is probably better than ours, but not as keen as a dog's hearing. Their sight is probably comparable to that of a human. Black bears tend to favor forested habitats.

Bears are opportunists, relying on their intelligence and their senses to find food. They use different habitats throughout the year, depending on the availability of food and other necessities. The area a bear covers in a given year is partially dependent on how far it has to go to satisfy these basic needs. In some areas, individual bears have home ranges of less than a square mile; in other areas ranges can encompass hundreds of square miles. Males usually range over larger areas than females.

In spring, bears begin coming out of hibernation. Males are usually the first bears to emerge, usually in April, and females with new cubs are usually the last, sometimes as late as late June. When bears emerge from their dens, they are lethargic for the first few days, frequently sleeping near their dens and not eating. When they do start eating, they seek carrion (deer, etc.), roots, and emerging vegetation. In coastal areas, beaches become travel corridors as bears seek these foods.

In early summer, bears eat new grasses and forage as they develop in higher elevations. In coastal areas, salmon are the most important food from June through September. This period is one of the few times that bears are found in large groups, and it is the time that most people see bears. Bears often travel, eat, and sleep along streams for weeks at a time.

Other summer foods for bears include grasses and ground squirrels. When bears kill or scavenge large prey, they commonly cover the portions they cannot eat with sticks and duff. A bear may remain near a food cache for days and it will defend it from intruders.

During the late summer and early fall, bears move inland and consume large amounts of blueberries, and other succulent fruits. As the seasons progress towards winter, a bear's diet becomes more varied. This is the time that bears are adding final deposits of fat before their long winter naps.

In October and November, bears move into their denning areas and begin preparing a suitable den. Black bears usually den in holes under large trees or rock outcrops, or in small natural cavities. Dens are just large enough for the bears to squeeze into. Bears rarely eat, drink, urinate, or defecate while they are denning. They sleep deeply, but do not truly hibernate, and they can be awakened by loud noises or disturbances.

Cubs are born in the den, usually in January. Black bear cubs usually stay with their mothers for a year and a half. Black bears are sexually mature at age 2. Mating season is in the spring (May or June) and both species are polygamous (multiple mates). Black bears can live for 25 – 30 years, although most live less than 20 years.

#### **BEAR AND HUMAN INTERACTIONS**

Bears generally prefer to be left alone, but they share their homes with other creatures, including humans, who intrude on virtually every aspect of the bear's life. Bears are normally tolerant of these activities and generally find a secure way to avoid them. Humans can help bears make a graceful retreat and avoid many close encounters by letting them know we are coming. Walking in groups, talking, and wearing noise making devices, such as bear bells, all serve to warn a bear of your approach. When possible, avoid hiking and camping in areas where bears are common, such as bear trails through heavy brush or along salmon streams. Always keep an eye out for bears and bear signs. If you happen upon a dead animal, especially one that is covered with sticks and duff (a bear cache), immediately retreat the way you came, but do not run, and make a detour around the area. If you see a cub up a tree or a small bear walking alone, immediately retreat and detour around the area. Like all young animals, cubs wander away from their mothers, but females are furiously protective when they believe their cubs are threatened. Even if we do everything possible to avoid meeting a bear, sometimes bears come to us.

Bears are both intelligent and opportunistic, and they express these qualities through their curiosity. This curiosity frequently brings them into "human habitat." When this happens, we often feel vulnerable, and the bear is sometimes viewed as a threat or nuisance. In most cases, a curious bear will investigate a "human sign," perhaps test it out (chew on a raft, bite into some cans, etc.), and leave, never to return. If the bear was rewarded during his investigation by finding something to eat, it is hard to stop them from returning once they have had a food-reward. That is why we emphasize the importance of keeping human food and garbage away from bears. When in bear country, always think about the way you store, cook, and dispose of your food. **Never feed bears!** This is both illegal and foolish. Food should be stored in airtight containers, preferably away from living and sleeping areas. Garbage should be thoroughly incinerated as soon as possible. Fish and game should be cleaned well away from camp, and clothing that smells of fish and game should be stored away from sleeping areas. Menstruating women should take extra precautions to keep themselves as clean as possible, and soiled tampons and pads should

be treated as another form of organic garbage. Once a bear has obtained food from people, it may continue to frequent areas occupied by people. If a bear does not find food or garbage after the next few tries, it may give up and move back into a more natural feeding pattern. Occasionally, though, the bear will continue to seek human foods and can become a "problem bear." Some bears become bold enough to raid campsites and break into cabins to search for human food. Shooting bears in the rump with cracker shells, flares, rubber bullets, and birdshot are common methods of "aversive conditioning." These are also very dangerous techniques, because they may seriously injure a bear if not done properly and/or they may cause a bear to attack the shooter.

## **BLACK BEARS**

**Black Bear Identification:** Black bears are the smallest and most abundant of the bear species. They are five to six feet long and stand about two to three feet high at the shoulders. They weigh from 200 to 500 pounds. While they are most commonly black, other color phases include brown (cinnamon), and, rarely, gray (blue), and white. Muzzles are usually brown. Black bears can be distinguished from brown bears by:

- Their head shape (a black bear's nose is straight in profile, a brown bear's is dished);
- Their claws (black bear's claws are curved and smaller, brown bears are relatively straight and longer);
- Their body shape (when standing, a black bear's rump seems to be higher than its shoulders; a brown bear's shoulders are usually higher than its rump); and

**Typical Habitat:** Black bears occupy a wide range of habitats, but seem to be most common in forested areas.

## **AVOIDING BEAR ENCOUNTERS WHEN**

- **The Bear sees you but you do not know the bear is around:** The bear will likely avoid detection people and will simply move away when they sense a human.
- **You see a bear and it does not know you are there:** Move away slowly. Avoid intercepting the bear if it is walking. If possible, detour around the bear. If the bear is close to you, stand where you are or back away slowly. Do not act threateningly toward the bear, it may know you are there but it has chosen to ignore you as long as you are not a threat.
- **You see the bear and the bear sees you:** Do not act threateningly, but let the bear know you are human. Wave your arms slowly, talk in a calm voice, and walk away slowly in a lateral direction, keeping an eye on the bear. Unless you are very close to a car or a building, never run from bears. In a bear's world, when something runs it is an open invitation to chase it. Bears will chase a running object even if they have no previous intention of catching it. Bears can run as fast as a racehorse, so humans have little or no chance of outrunning a bear.
- **You see a bear, the bear sees you and stands on its hind legs:** This means that the bear is seeking more information. Bears stand on their hind legs to get a better look, or smell, at something they are uncertain of. It is your cue to help it figure

out what you are. Help the bear by waving your arms slowly and talking to it. Standing is not a precursor to an attack. Bears do not attack on their hind legs. It is also important to remember that when a bear goes back down on all fours from a standing position, it may come towards you a few steps. This is normal, and probably not an aggressive act.

- The bear sees you, recognizes you as a human, but continues to come towards you slowly: This may mean several things, depending on the bear and the situation. It may mean that the bear does not see you as a threat, and just wants to get by you (especially if the bear is used to humans, as in a National Park); the bear wants to get food from you (if it has gotten food from people before); the bear wants to test your dominance (it views you as another bear); or may be stalking you as food (more common with black bear, but a rare occurrence). In all cases, your reaction should be to back off the trail very slowly, stand abreast if you are in a group, talk loudly, and/or use a noise-making device. If the bear continues to advance, you should stop. At this point, it is important to give the bear the message that if he continues to advance it will cost him. Continue to make loud noises and present a large visual image to the bear (standing abreast, open your coat). In bear language, bears assert themselves by showing their size. If an adult brown bear continues to come at you, climbing 20 feet or higher up a tree may also be an option if one is next to you (remember, never run from bears). Keep in mind, though, black bears can climb trees.
- The bear recognizes you as a human and acts nervous or aggressive: When bears are nervous or stressed they can be extremely dangerous. This is when it is important to try to understand what is going on in the bears mind. Nervous bears growl, woof, make popping sounds with their teeth, rock back and forth on their front legs, and often stand sideways to their opponent. A universal sign of a nervous bear is excessive salivation (sometimes it looks like they have white lips). When a bear shows any of these signs, stand where you are and talk in a calm voice. Do not try to imitate bear sounds, this may only serve to confuse and further agitate the bear. If you are in a group, stand abreast.
- The bear charges: If all other signals fail, a bear will charge. Surprisingly, most bear charges are just another form of their language. The majority of these are "bluff charges," that is; the bear stops before making contact with their opponent. There are many different types of bluff charges ranging from a loping uncertain gait to a full-blown charge. If a bear charges, stand still.
- The bear attacks: When all else fails, a bear may attack. Attacks may be preceded by all of the behaviors previously described or they may be sudden. Seemingly unprovoked attacks are often the result of a bear being surprised (and feeling threatened), a bear defending its food cache, or a female defending her cubs. When a bear attacks, it typically runs with its body low to the ground, legs are stiff, ears are flattened, hair on the nape of the neck is up, and the bear moves in a fast, determined way. Front paws are often used to knock the opponent down and jaws are used to subdue it.



#### **AFTER A BEAR ENCOUNTER**

Black bears have been known to view humans as prey, and if you struggle with the attacking black bear, it will probably go elsewhere for its meal.

- **Bear Sprays:** Are easy to carry and use, little risk of permanent damage to bears and humans, effective in many situations. However, using a spray may change a false charge into a real charge, they are ineffective at ranges greater than 20 feet, ineffective in windy conditions, dangerous if accidentally discharged in a closed area such as an aircraft cockpit.

The most effective tool you have against an attacking bear is your brain. Although bears are intelligent animals, we are smarter and can often think our way out of a bad situation if we try.

## **ATTACHMENT 2**

### **HAZARDS AND PRECAUTIONS – DEER**

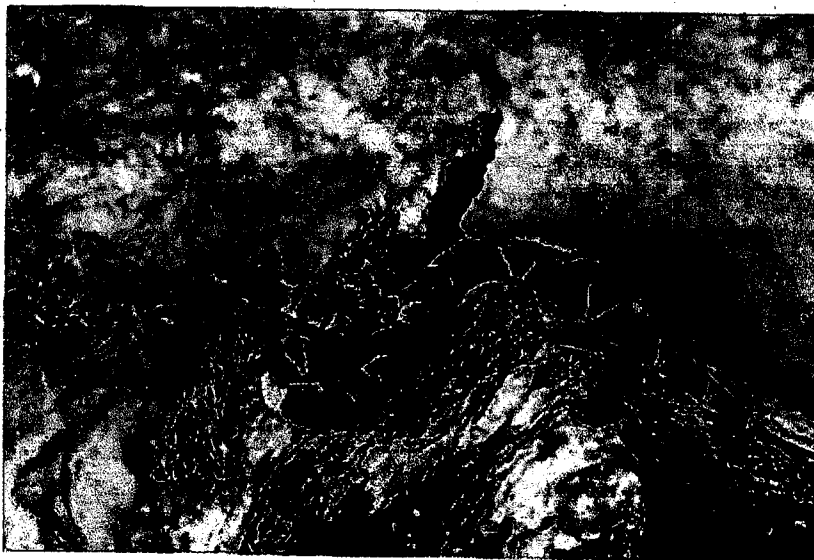
The following technical information, precautions, and guidelines for operations in which Deer may be encountered. The more the species are understood, the easier it will be to avoid contact with them thus preventing injury to ourselves and to the animals. All big game species are unpredictable and can be dangerous under certain conditions. This attachment is intended to provide information that will enable Weston to plan for encounters and to properly address face-to-face encounters.

### **WHITE-TAILED DEER**

The White-tailed deer found throughout the eastern and western part of the United States have been known to attack people on many occasions. It is unknown whether Black-tailed deer have made any such attacks, but it is possible for someone to be injured by an irate buck in the breeding season (late fall). Deer are well equipped to injure humans. They are very fast. Bucks have sharp antlers and can clear amazingly high obstacles with graceful, arching leaps. They can run with remarkable speed, even in dense cover, and have excellent camouflage. When working in areas populated with deer, it is just common sense not to approach any large wild animal too closely. It is unlikely that an attack from a deer would be fatal but it is possible and serious injury is likely.

## **APPENDIX B - PICTURES OF POISONOUS SNAKES AND LIZARDS**

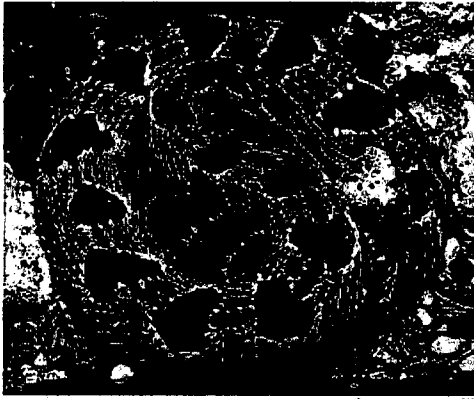
### **Americas**



**American copperhead**



**Cotton Mouth – East and Southeast US**



**Timber Rattlesnake – Eastern US**



## **FLD 43 B     INSECTS**

### **Sting and Biting Insects**

Contact with stinging insects may result in site personnel experiencing adverse health affects that range from being mildly uncomfortable to being life threatening. Therefore, stinging insects present a serious hazard to site personnel and extreme caution must be exercised whenever site and weather conditions increase the risk of encountering stinging insects. These include the following:

- Bees (Honeybees, bumble bees, wasps, and hornets and wingless wasps)
- Scorpions
- Fire ants
- Spiders
- Ticks
- Deer Flies
- Mosquito
- Fleas
- Bed Bugs

### **Bees, Wasps, Hornets and Yellow Jackets**

The severity of an insect sting reaction varies from person to person. A normal reaction will result in pain, swelling and redness confined to the sting site. Simply disinfect the area (washing with soap and water will do) and apply ice to reduce the swelling.

A large local reaction will result in swelling that extends beyond the sting site. For example, a sting on the forearm could result in the entire arm swelling twice its normal size.

Although alarming in appearance, this condition is often treated the same as a normal reaction. An unusually painful or very large local reaction may need medical attention. Because this condition may persist for two to three days, antihistamines and corticosteroids are sometimes prescribed to lessen the discomfort.

Yellow jackets, hornets and wasps can sting repeatedly. Honeybees have barbed stingers that are left behind in their victim's skin. These stingers are best removed by a scraping action, rather than a pulling motion, which may actually squeeze more venom into the skin.

### **Scorpions (Caribbean)**

Scorpion stings are a major public health problem in many underdeveloped tropical countries. For every person killed by a poisonous snake, 10 are killed by a poisonous scorpion. In the United States, only 4 deaths in 11 years have occurred as a result of scorpion stings. Furthermore, scorpions can be found outside their normal range of distribution, ie, when they



accidentally crawl into luggage, boxes, containers, or shoes and are unwittingly transported home via human travelers.

Out of 1,500 scorpion species, 50 are dangerous to humans. Scorpion stings cause a wide range of conditions, from severe local skin reactions to neurologic, respiratory, and cardiovascular collapse.

Almost all of these lethal scorpions belong to the scorpion family called the Buthidae. The Buthidae are small to mid-size scorpions (0.8 inch to 5.0 inches) and normally uniformly colored without patterns or shapes. Poisonous scorpions also tend to have weak-looking pincers, thin bodies, and thick tails, as opposed to the strong heavy pincers, thick bodies, and thin tails seen in nonlethal scorpions. The lethal members of the Buthidae family include the genera of *Tityus* which can be found in the Caribbean.

A scorpion has a flattened elongated body and can easily hide in cracks. Scorpions are members of the Arachnid (spider) family. The bodies consist of 3-segments, they also have 4 pairs of legs, a pair of claws, and a segmented tail that has a poisonous spike at the end. Scorpions vary in size from 1-20 cm in length.

However, scorpions may be found outside their habitat range of distribution when inadvertently transported with luggage and cargo.

### **Prevention**

Preventive measures include awareness of scorpions, shaking out clothing and boots before putting them on looking before reaching into likely hiding places and wearing gloves, long sleeved shirts and pants.

### **Symptoms**

In mild cases, the only symptom may be a mild tingling or burning at site of sting.

In severe cases, symptoms may include:

- Eyes and ears - Double vision
- Lungs - Difficulty breathing, No breathing, Rapid breathing,
- Nose, mouth, and throat – Drooling, Spasm of the voice box, Thick-feeling tongue
- Heart and blood - High blood pressure, Increased or decreased heart rate, Irregular heartbeat
- Kidneys and bladder Urinary incontinence, Urine output, decreased
- Muscles and joints - Muscle spasms
- Nervous system – Paralysis, Random movements of head, eye, or neck, Restlessness, Seizures, Stiffness
- Stomach and intestinal tract - Abdominal cramps, Fecal incontinence
- Other -Convulsions

## **Treatment**

1. Recognize scorpion sting symptoms:
2. Wash the area with soap and water.
3. Apply a cool compress on the area of the scorpion sting. Ice (wrapped in a washcloth or other suitable covering) may be applied to the sting location for 10 minutes. Remove compress for 10 minutes and repeat as necessary.
4. Call the Poison Control Center. If you develop symptoms of a poisonous scorpion sting, go to the nearest emergency care facility.
5. Keep your tetanus shots and boosters current.

## **Fire Ants (Caribbean)**

Fire ants are aggressive, reddish-brown to black ants that are 1/8 inch to 1/4 inch long. They construct nests, which are often visible as dome-shaped mounds of soil, sometimes as large as 3 feet across and 1 1/2 feet in height. In sandy soils, mounds are flatter and less visible. Fire ants usually build mounds in sunny, open areas such as lawns, pastures, cultivated fields and meadows, but they are not restricted to these areas. Mounds or nests may be located in rotting logs, around trees and stumps, under pavement and buildings, and occasionally indoors.

Fire ants use their stingers to immobilize or kill prey and to defend ant mounds from disturbance by larger animals, such as humans. Any disturbance sends hundreds of workers out to attack anything that moves. The ant grabs its victim with its mandibles (mouthparts) and then inserts its stinger. The process of stinging releases a chemical, which alerts other ants, inducing them to sting. In addition, one ant can sting several times without letting go with its mandibles.

Once stung, humans experience a sharp pain that lasts a couple of minutes, then after a while the sting starts itching and a welt appears. Fire ant venom contains alkaloids and a relatively small amount of protein. The alkaloids kill skin cells; this attracts white blood cells, which form a pustule within a few hours of being stung. The fluid in the pustule is sterile, but if the pustule is broken, the wound may become infected. The protein in the venom can cause allergic reactions that may require medical attention.

Some of the factors related to stinging insects that increase the risk associated with accidental contact are:

- The nests for these insects are frequently found in remote wooded or grassy areas and hidden in cavities
- The nests can be situated in trees, rocks, bushes or in the ground, and are usually difficult to see
- Accidental contact with these insects is highly probable, especially during warm weather conditions when the insects are most active
- If a site worker accidentally disturbs a nest, the worker may be inflicted with multiple stings, causing extreme pain and swelling which can leave the worker incapacitated and in need of medical attention

- Some people are hypersensitive to the toxins injected by a sting, and when stung, experience a violent and immediate allergic reaction resulting in a life-threatening condition known as anaphylactic shock
- Anaphylactic shock manifests itself very rapidly and is characterized by extreme swelling of the body, eyes, face, mouth and respiratory passages
- The hypersensitivity needed to cause anaphylactic shock, can in some people, accumulate over time and exposure, therefore, even if someone has been stung previously, and not experienced an allergic reaction, there is no guarantee that they will not have an allergic reaction if they are stung again

With these things in mind, and with the high probability of contact with stinging insects, use the following safe work practices:

- If a worker knows that he is hypersensitive to bee, wasp or hornet stings, inform the site Safety officer of this condition prior to participation in site activities
- All site personnel will be watchful for the presence of stinging insects and their nests, and will advise the Site Safety officer if a stinging insect nest is located or suspected in the area
- Any nests located on site will be flagged off and site personnel will be notified of its presence
- If attacked, site personnel will immediately seek shelter and stay there. Do not jump in water (bees will still be in the area when you come up). Once safe, remove stings from your skin, it does not matter how you do it, but do it as quickly as possible to reduce the amount of venom they inject. Obtain first aid treatment and contact the safety officer who will observe for signs of allergic reaction

Treatment for fire ant stings is aimed at preventing secondary bacterial infection, which may occur if the pustule is scratched or broken. Clean the blisters with soap and water to prevent secondary infection. Do not break the blister. Topical corticosteroid ointments and oral antihistamines may relieve the itching associated with these reactions.

Site personnel with a known hypersensitivity to stinging insects will keep required emergency medication on or near their person at all times

## **Spiders**

A large variety of spiders may be encountered during site activities. Extreme caution must be used when lifting logs and debris, since spiders are typically found in these areas.

While most spider bites merely cause localized pain, swelling, reddening, and in some cases, tissue damage, there are a few spiders that, due to the severity of the physiological affects caused by their venom, are dangerous.

**Black Widow:** The black widow is a coal-black bulbous spider 3/4 to 1 1/2 inches in length, with a bright red hourglass on the under side of the abdomen. The black widow is usually found in dark moist locations, especially under rocks, rotting logs and may even be found in outdoor toilets where they inhabit the underside of the seat. Victims of a black widow bite may exhibit the following signs or symptoms:

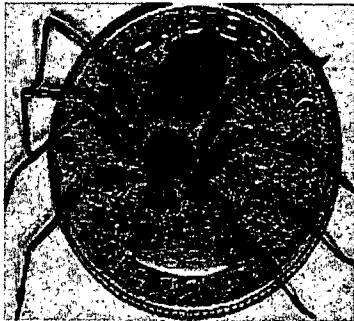
- Sensation of pinprick or minor burning at the time of the bite
- Appearance of small punctures (but sometimes none are visible)
- After 15 to 60 minutes, intense pain is felt at the site of the bite which spreads quickly, and is followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, poor coordination, dilated pupils and generalized swelling of face and extremities

**Brown Recluse:** The brown or violin spider is brownish to tan in color, rather flat, and 1/2 to 5/8 inches long. However, unlike the typical species, this spider has been encountered without a violin or "fiddle" shaped mark on the top of the head. Of the brown spider, there are three varieties found in the United States that present a problem to site personnel. These are the brown recluse, the desert violin and the Arizona violin. These spiders may be found in a variety of locations including trees, rocks or in dark locations. Victims of a brown or violin spider bite may exhibit the following signs or symptoms:

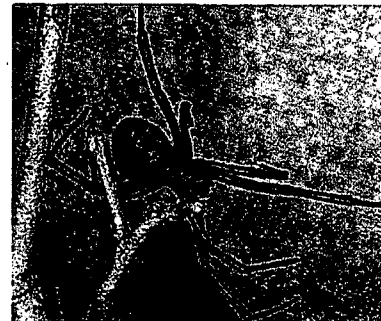
- Blistering at the site of the bite, followed by a local burning at the site 30 to 60 minutes after the bite
- Formation of a large, red, swollen, postulating lesion with a bull's-eye appearance
- Systemic affects may include a generalized rash, joint pain, chills, fever, nausea and vomiting
- Pain may become severe after 8 hours, with the onset of tissue necrosis

There is no effective first aid treatment for either of these bites. Except for very young, very old or weak victims, spider bites are not considered to be life threatening. However, medical treatment must be sought to reduce the extent of damage caused by the injected toxins.

#### **Brown Recluse Spider**



#### **Black Widow Spider**



First aid should include:

- If possible, catch the spider to confirm its identity. Even if the body is crushed, save it for identification
- Clean the bitten area with soap and water or rubbing alcohol
- To relieve pain, place an ice pack over the bite
- Keep the victim quiet and monitor breathing

**Seek immediate medical attention**

### **Sensitivity Reaction to Insect Stings or Bites**

A sensitivity reaction is one of the more dangerous and acute effects of insect bites or stings. It is the most common cause of fatalities from bites, particularly from bees, wasps, and spiders. Anaphylactic shock due to stings can lead to severe reactions in the circulatory, respiratory, and central nervous system. This can also result in death.

Site personnel must be questioned regarding their allergic reaction to insect bites. Anyone knowingly allergic should be required to carry and know how to use a response kit (e.g., Epi-Kit). First aid providers must be instructed on how to use the kit also. The kit must be inspected to ensure it is updated.

Administer first aid and observe persons reporting stings for signs of allergic reaction, such as unusual swelling, nausea, dizziness, and shock. At the first sign of these symptoms, take the individual to a medical facility for attention.

### **Insect Borne Diseases**

Diseases that are spread by insects include the following: Lyme Disease (tick); Bubonic and other forms of Plague (fleas); Malaria, West Nile Virus and Equine Encephalitis (mosquito).

### **Tick Borne Diseases**

Lyme disease is the second most rapidly spreading disease in the U.S.

#### **Lyme Disease**

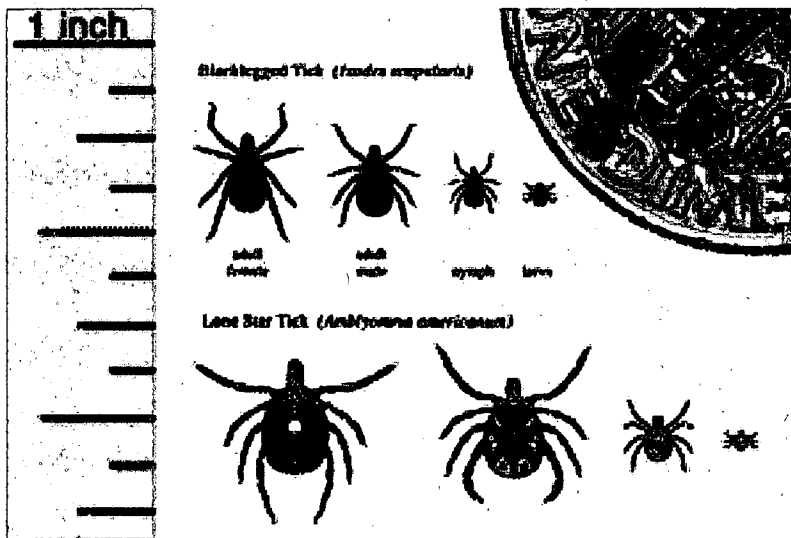
##### **1. Facts**

##### **Definition:**

- Bacterial infection transmitted by the bite of an infected black-legged tick more popularly known as the deer tick.
- Prevalence (nationwide and other countries).
- Three stages/sizes of deer ticks:
  - Larvae
  - Nymph
  - Adult

Tick season is May through October.

Not all ticks transmit Lyme disease (Black legged or deer tick [upper] compared to the Lone Star tick [lower])



- Ticks must be attached for several hours before Lyme disease can be transmitted.
- Being bitten by a tick does not mean you will get Lyme disease.

## 2. Prevention and Protection:

- Wear light-colored, tight-knit clothing.
- Wear long pants and long-sleeved shirts.
- Tuck pant legs into shoes or boots.
- Wear a hat.
- Use insect repellent containing DEET ((follow manufacturer's instructions for use).
- Check yourself daily for ticks after being in grassy, wooded areas.
- Request information from the Health and Safety Medical Section regarding Lyme Disease.

## 3. If Bitten:

- Remove the tick immediately with fine-tipped tweezers. Grasp the tick as close to the skin as possible. Pull gently but firmly without twisting or crushing the tick.
- Wash your hands and dab the bite with an antiseptic.



- Save the tick in a jar in some alcohol. Label the jar with the date of the bite, the area where you picked up the tick and the spot on your body where you were bitten.
- Monitor the bite for any signs of infection or rash.

#### 4. Symptoms:

Early Signs (may vary from person to person)

- Expanding skin rash.
- Flu-like symptoms during summer or early fall that include the following:
  - Chills, fever, headache, swollen lymph nodes.
  - Stiff neck, aching joints, and muscles.
  - Fatigue.
- Later signs
  - Nervous system problems.
  - Heart problems.
  - Arthritis, especially in knees.

#### 5. Upon Onset of Symptoms:

- Notify your Safety Officer (SO) and your supervisor.

### **Ehrlichiosis**

Ehrlichiosis is the general name used to describe several bacterial diseases that affect animals and humans. These diseases are caused by the organisms in the genus *Ehrlichia*. Worldwide, there are currently four ehrlichial species that are known to cause disease in humans.

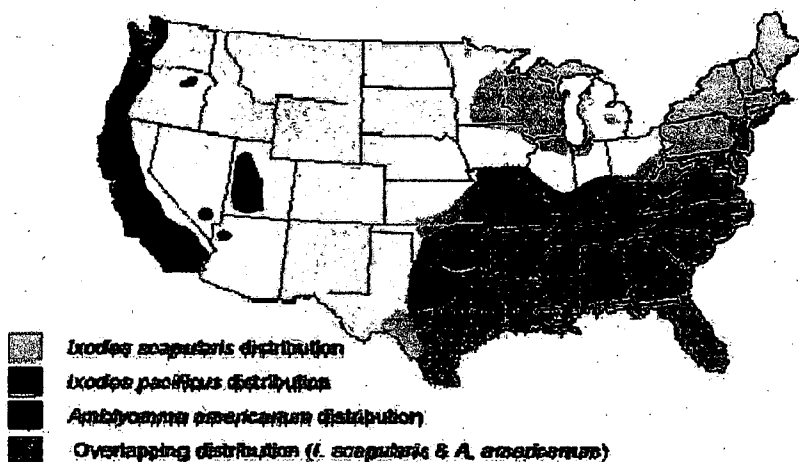
In the United States, ehrlichiae are transmitted by the bite of an infected tick. The lone star tick (*Amblyomma americanum*) and the blacklegged tick (*Ixodes scapularis*) are known vectors of ehrlichiosis.

The symptoms of ehrlichiosis may resemble symptoms of various other infectious and non-infectious diseases. These clinical features generally include fever, headache, fatigue, and muscle aches. Other signs and symptoms may include nausea, vomiting, diarrhea, cough, joint pains, confusion, and occasionally rash. Symptoms typically appear after an incubation period of 5-10 days following the tick bite. It is possible that many individuals who become infected with ehrlichiae do not become ill or they develop only very mild symptoms.

Most cases of ehrlichiosis are reported within the geographic distribution of the vector ticks (see map below). Occasionally, cases are reported from areas outside the distribution of the tick vector. In most instances, these cases have involved persons who traveled to areas where the diseases are endemic, and who had been bitten by an infected tick and developed symptoms after

returning home. Therefore, if you traveled to an ehrlichiosis-endemic area 2 weeks prior to becoming ill, you should tell your doctor where you traveled.

**Figure 20. Areas where human ehrlichiosis may occur based on approximate distribution of vector tick species**



A diagnosis of ehrlichiosis is based on a combination of clinical signs and symptoms and confirmatory laboratory tests. Blood samples can be sent to a reference laboratory for testing. However, the availability of the different types of laboratory tests varies considerably. Other laboratory findings indicative of ehrlichiosis include low white blood cell count, low platelet count, and elevated liver enzymes.

Ehrlichiosis is treated with a tetracycline antibiotic, usually doxycycline.

Very little is known about immunity to ehrlichial infections. Although it has been proposed that infection with ehrlichiae confers long-term protection against reinfection, there have been occasional reports of laboratory-confirmed reinfection. Short-term protection has been described in animals infected with some *Ehrlichia* species and this protection wanes after about 1 year. Clearly, more studies are needed to determine the extent and duration of protection against reinfection in humans.

Limiting exposure to ticks reduces the likelihood of infection in persons exposed to tick-infested habitats. Prompt careful inspection of your body and removal of crawling or attached ticks is an important method of preventing disease. It may take 24–48 hours of attachment before microorganisms are transmitted from the tick to you.

#### **Preventive measures - Follow protection protocols for Lyme disease**

##### **Babesiosis**

Babesiosis is an intraerythrocytic parasitic infection caused by protozoa of the genus *Babesia* and transmitted through the bite of the *Ixodes* tick, the same vector responsible for transmission of Lyme disease. While most cases are tick-borne, transfusion and transplacental transmission

have been reported. In the United States, babesiosis is usually an asymptomatic infection in healthy individuals. Several groups of patients become symptomatic, and, within these subpopulations, significant morbidity and mortality occur. The disease most severely affects patients who are elderly, immunocompromised, or asplenic. Among those symptomatically infected, the mortality rate is 10% in the United States.

The primary vectors of the parasite are ticks of the genus *Ixodes*. In the United States, the black-legged tick, *Ixodes scapularis* (also known as *Ixodes dammini*) is the primary vector for the parasite. The *Ixodes* tick vector for *Babesia* is the same vector that locally transmits *Borrelia burgdorferi*, the agent implicated in Lyme disease. The primary US animal reservoir is the white-footed mouse, *Peromyscus leucopus*. Additionally, white-tailed deer serve as transport hosts for the adult tick vector, *I. scapularis*.

The Ixodid ticks ingest *Babesia* during feeding from the host, multiply the protozoa in their gut wall, and concentrate it in their salivary glands. The tick inoculates a new host when feeding again. The parasite then infects red blood cells (RBCs) and differentiated and undifferentiated trophozoites are produced. The former produce 2-4 merozoites that disrupt the RBC and go on to invade other RBCs. This leads to hemolytic anemia, thrombocytopenia, and atypical lymphocyte formation. Alterations in RBC membranes cause decreased conformability and increased red cell adherence, which can lead to development of acute respiratory distress syndrome (ARDS) among those severely affected.

The signs and symptoms mimic malaria and range in severity from asymptomatic to septic shock.

Symptoms include: Generalized weakness, fatigue, depression, fever, anorexia and weight loss, CNS - Headache, photophobia, neck stiffness, altered sensorium, pulmonary - Cough, shortness of breath, GI - Nausea, vomiting, abdominal pain, Musculoskeletal - Arthralgia and myalgia and Renal - Dark urine

### **Prevention**

Prevention measures are the same as for Lyme and other insect borne diseases

### **Tularemia**

**Tularemia** (also known as "rabbit fever") is a serious infectious disease caused by the bacterium *Francisella tularensis*. The disease is endemic in North America. The primary vectors are ticks and deer flies, but the disease can also be spread through other arthropods. Animals such as rabbits, prairie dogs, hares and muskrats serve as reservoir hosts.

Depending on the site of infection, tularemia has six characteristic clinical syndromes: ulceroglandular, glandular, oropharyngeal, pneumonic, oculoglandular, and typhoidal.

The disease has a very rapid onset, with headache, fatigue, dizziness, muscle pains, loss of appetite and nausea. Face and eyes redden and become inflamed. Inflammation spreads to the

lymph nodes, which enlarge and may suppurate (mimicking bubonic plague). Lymph node involvement is accompanied by a high fever. Death may result.

*Francisella tularensis* is one of the most infective bacteria known; fewer than ten organisms can cause disease leading to severe illness. The bacteria penetrate into the body through damaged skin and mucous membranes, or through inhalation. Humans are most often infected by tick bite or through handling an infected animal. Ingesting infected water, soil, or food can also cause infection. Tularemia can also be acquired by inhalation; hunters are at a higher risk for this disease because of the potential of inhaling the bacteria during the skinning process. Tularemia is not spread directly from person to person.

No vaccine is available to the general public. The best way to prevent tularemia infection is to wear rubber gloves when handling or skinning rodents or lagomorphs (as rabbits), avoid ingesting uncooked wild game and untreated water sources, and wearing long-sleeved clothes and using an insect repellent to prevent tick bites.

### **Prevention**

No vaccine is available to the general public. The best way to prevent tularemia infection is to wear rubber gloves when handling or skinning rodents or lagomorphs (as rabbits), avoid ingesting uncooked wild game and untreated water sources, and wearing long-sleeved clothes and using an insect repellent to prevent tick bites.

### **Other diseases primarily transmitted by Arthropods (Ticks, mites, lice etc.)**

**Typhus** (Not to be confused with Typhoid Fever [discussed in these FLDs])

*For the unrelated disease caused by Salmonella typhi, see Typhoid fever. For the unrelated disease caused by Salmonella paratyphi, please refer to Paratyphoid fever. For the monster of Greek mythology, see Typhus (monster).*

**Typhus** is any one of several similar diseases caused by louse-borne bacteria. The name comes from the Greek *typhos*, meaning smoky or lazy, describing the state of mind of those affected with typhus. *Rickettsia* is endemic in rodent hosts, including mice and rats, and spreads to humans through mites, fleas and body lice. The arthropod vector flourishes under conditions of poor hygiene, such as those found in prisons or refugee camps, amongst the homeless, or until the middle of the 20th century, in armies in the field. In tropical countries, typhus is often mistaken for dengue fever.

### **Endemic typhu**

Endemic typhus (also called "flea-borne typhus" and "murine typhus" or "rat flea typhus") is caused by the bacteria *Rickettsia typhi*, and is transmitted by the flea that infest rats. Symptoms of endemic typhus include headache, fever, chills, myalgia, nausea, vomiting, and cough.

Endemic typhus is highly treatable with antibiotics. Most people recover fully, but death may occur in the elderly, severely disabled or patients with a depressed immune system.

## **Encephalitis Arboviral Encephalitides**

### **Perspectives**

Arthropod-borne viruses, i.e., arboviruses, are viruses that are maintained in nature through biological transmission between susceptible vertebrate hosts by blood feeding arthropods (mosquitoes, phlebotomids, ceratopogonids, and ticks). Vertebrate infection occurs when the infected arthropod takes a blood meal. The term 'arbovirus' has no taxonomic significance. Arboviruses that cause human encephalitis are members of three virus families: the *Togaviridae* (genus *Alphavirus*, *Flaviviridae*, and *Bunyaviridae*).

All arboviral encephalitides are zoonotic, being maintained in complex life cycles involving a nonhuman primary vertebrate host and a primary arthropod vector. These cycles usually remain undetected until humans encroach on a natural focus, or the virus escapes this focus via a secondary vector or vertebrate host as the result of some ecologic change. Humans and domestic animals can develop clinical illness but usually are "dead-end" hosts because they do not produce significant viremia, and do not contribute to the transmission cycle. Many arboviruses that cause encephalitis have a variety of different vertebrate hosts and some are transmitted by more than one vector. Maintenance of the viruses in nature may be facilitated by vertical transmission (e.g., the virus is transmitted from the female through the eggs to the offspring).

Arboviral encephalitides have a global distribution, but there are four main virus agents of encephalitis in the United States, all of which are transmitted by mosquitoes. A new Powassan-like virus has recently been isolated from deer ticks. Its relatedness to Powassan virus and its ability to cause disease has not been well documented. Most cases of arboviral encephalitis occur from June through September, when arthropods are most active. In milder (i.e., warmer) parts of the country, where arthropods are active late into the year, cases can occur into the winter months.

**There is expanded discussion of several of these diseases (West Nile and Eastern Equine Encephalitis elsewhere in this document. A more general discussion is found in Attachment 2.**

## **Mosquito Borne Diseases**

### **Malaria**

**Malaria** is a mosquito-borne disease caused by a parasite. Four kinds of malaria parasites can infect humans: *Plasmodium falciparum*, *P. vivax*, *P. ovale*, and *P. malariae*.



People with malaria often experience fever, chills, and flu-like illness. Left untreated, they may develop severe complications and die. Each year 350-500 million cases of malaria occur worldwide. Infection with any of the malaria species can make a person feel very ill; infection with *P. falciparum*, if not promptly treated, may be fatal. Although malaria can be a fatal disease, illness and death from malaria are largely preventable.

This sometimes fatal disease can be prevented and cured. Bed nets, insecticides, and anti-malarial drugs are effective tools to fight malaria in areas where it is transmitted. Travelers to a malaria-risk area should avoid mosquito bites and take a preventive anti-malarial drug. Malaria was eradicated from the United States in the early 1950s. However, malaria is common in many developing countries and travelers who visit these areas risk getting malaria.

Returning travelers and arriving immigrants could also reintroduce the disease in the United States if they are infected with malaria when they return. The mosquito that transmits malaria, *Anopheles*, is found throughout much of the United States. If local mosquitoes bite an infected person, those mosquitoes can, in turn, infect local residents (*introduced malaria*).

Because the malaria parasite is found in red blood cells, malaria can also be transmitted through blood transfusion, organ transplant, or the shared use of needles or syringes contaminated with blood. Malaria may also be transmitted from a mother to her fetus before or during delivery ("congenital" malaria).

Malaria is not transmitted from person to person like a cold or the flu. You cannot get malaria from casual contact with malaria-infected people.



## **Prevention and control**

You can prevent malaria by:

- keeping mosquitoes from biting you, especially at night
- taking anti-malarial drugs to kill the parasites
- eliminating places where mosquitoes breed
- spraying insecticides on walls to kill adult mosquitoes that come inside
- sleeping under bed nets - especially effective if they have been treated with insecticide,
- wearing insect repellent and long-sleeved clothing if out of doors at night

The surest way for you and your health-care provider to know whether you have malaria is to have a diagnostic test where a drop of your blood is examined under the microscope for the presence of malaria parasites. If you are sick and there is any suspicion of malaria (for example, if you have recently traveled in a malaria-risk area) the test should be performed without delay.

The disease should be treated early in its course, before it becomes severe and poses a risk to the patient's life. Several good anti-malarial drugs are available, and should be administered early on. The most important step is to think about malaria, so that the disease is diagnosed and treated in time.

## **West Nile Virus**

West Nile virus (WNV) is a potentially serious illness. Experts believe WNV is established as a seasonal epidemic in North America that flares up in the summer and continues into the fall. This fact sheet contains important information that can help you recognize and prevent WNV.

The easiest and best way to avoid WNV is to prevent mosquito bites.

- When you are outdoors, use insect repellent containing an EPA-registered active ingredient. Follow the directions on the package.
- Many mosquitoes are most active at dusk and dawn. Be sure to use insect repellent and wear long sleeves and pants at these times or consider staying indoors during these hours.
- Make sure you have good screens on your windows and doors to keep mosquitoes out.
- Get rid of mosquito breeding sites by emptying standing water from buckets, barrels and drainage ditches.

About one in 150 people infected with WNV will develop severe illness. The severe symptoms can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. These symptoms may last several weeks, and neurological effects may be permanent.

Up to 20 percent of the people who become infected have symptoms such as fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms can last for as short as a few days, though even healthy people have become sick for several weeks.

Approximately 80 percent of people (about 4 out of 5) who are infected with WNV will not show any symptoms at all. Most often, WNV is spread by the bite of an infected mosquito. Mosquitoes become infected when they feed on infected birds. Infected mosquitoes can then spread WNV to humans and other animals when they bite.

In a very small number of cases, WNV also has been spread through blood transfusions, organ transplants, breastfeeding and even during pregnancy from mother to baby.

WNV is not spread through casual contact such as touching or kissing a person with the virus.

Symptoms typically develop between 3 - 14 days after being bitten by an infected mosquito.

There is no specific treatment for WNV infection. In cases with milder symptoms, people experience symptoms such as fever and aches that pass on their own, although even healthy people have become sick for several weeks. In more severe cases, people usually need to go to the hospital where they can receive supportive treatment including intravenous fluids, help with breathing and nursing care.

Milder WNV illness improves on its own, and people do not necessarily need to seek medical attention for this infection though they may choose to do so. If you develop symptoms of severe WNV illness, such as unusually severe headaches or confusion, seek medical attention immediately. Severe WNV illness usually requires hospitalization. Pregnant women and nursing mothers are encouraged to talk to their doctor if they develop symptoms that could be WNV. People over the age of 50 are more likely to develop serious symptoms of WNV if they do get sick and should take special care to avoid mosquito bites.

The more time you're outdoors, the more time you could be bitten by an infected mosquito. Pay attention to avoiding mosquito bites if you spend a lot of time outside, either working or playing.

All donated blood is checked for WNV before being used. The risk of getting WNV through blood transfusions and organ transplants is very small, and should not prevent people who need surgery from having it. If you have concerns, talk to your doctor.

### **Equine Encephalitis**

Eastern equine encephalitis (EEE) is a mosquito-borne viral disease. EEE virus (EEEV) occurs in the eastern half of the United States where it causes disease in humans, horses, and some bird species. Because of the high mortality rate, EEE is regarded as one of the most serious mosquito-borne diseases in the United States.

EEEV is transmitted to humans through the bite of an infected mosquito. It generally takes from 3 to 10 days to develop symptoms of EEE after being bitten by an infected mosquito. The main EEEV transmission cycle is between birds and mosquitoes.

Many species of mosquitoes can become infected with EEEV. The most important mosquito species in maintaining the bird-mosquito transmission cycle is *Culiseta melanura*, which reproduces in freshwater hardwood swamps. *Culiseta melanura*, however, is not considered to be an important vector of EEEV to horses or humans because it feeds almost exclusively on birds.

Transmission to horses or humans requires mosquito species capable of creating a "bridge" between infected birds and uninfected mammals such as some *Aedes*, *Coquillettidia*, and *Culex* species.

Horses are susceptible to EEE and some cases are fatal. EEEV infections in horses, however, are not a significant risk factor for human infection because horses are considered to be "dead-end" hosts for the virus (i.e., the amount of EEEV in their bloodstreams is usually insufficient to infect mosquitoes).

Eastern equine encephalitis virus is a member of the family *Togaviridae*, genus *Alphavirus* closely related to Western equine encephalitis virus and Venezuelan equine encephalitis virus.

Many persons infected with EEEV have no apparent illness. In those persons who do develop illness, symptoms range from mild flu-like illness to inflammation of the brain, coma and death.

The mortality rate from EEE is approximately one-third, making it one of the most deadly mosquito-borne diseases in the United States.

There is no specific treatment for EEE; optimal medical care includes hospitalization and supportive care (for example, expert nursing care, respiratory support, prevention of secondary bacterial infections, and physical therapy, depending on the situation).

Approximately half of those persons who survive EEE will have mild to severe permanent neurologic damage.

Incidence rate includes:

- Approximately 220 confirmed cases in the US 1964-2004, Average of 5 cases/year, with a range from 0-15 cases
- States with largest number of cases includes New Jersey.
- EEEV transmission is most common in and around freshwater hardwood swamps in the Atlantic Coast states and the Great Lakes region.

- Human cases occur relatively infrequently, largely because the primary transmission cycle takes place in and around swampy areas where human populations tend to be limited.

#### **Risk Groups:**

- Residents of and visitors to endemic areas (areas with an established presence of the virus)
- People who engage in outdoor work and recreational activities in endemic areas.
- Persons over age 50 and younger than age 15 seem to be at greatest risk for developing severe EEE when infected with the virus.

#### **Prevention**

- A vaccine is available to protect equines.
- People should avoid mosquito bites by employing personal and workplace protection measures, such as using an EPA-registered repellent according to manufacturers' instructions, wearing protective clothing, avoiding outdoor activity when mosquitoes are active (some bridge vectors of EEEV are aggressive day-biters), and removing standing water that can provide mosquito breeding sites.
- There are laboratory tests to diagnosis EEEV infection including serology, especially IgM testing of serum and cerebrospinal fluid (CSF), and neutralizing antibody testing of acute- and convalescent-phase serum.

#### **Meningitis**

Meningitis is a viral disease that can affect the central nervous system that is transmitted through the bite from an infected mosquito.

Symptoms can be nonexistent or severe and flu-like, with fever, chills, tiredness, headache, nausea and vomiting. If not treated promptly the disease can be fatal.

#### **Prevention**

- A vaccine is available. It's 80% effective after a single dose and 97.5% effective after a second dose.

Use precautions as for other mosquito borne diseases. Avoid mosquito bites by employing personal and workplace protection measures, such as using an EPA-registered repellent according to manufacturers' instructions, wearing protective clothing, avoiding outdoor activity when mosquitoes are active and removing standing water that can provide mosquito breeding sites.

#### **Deer Flies (See Tularemia above)**

## **Fleas**

Flea is a common name for insects of the order Siphonaptera which are wingless insects with mouthparts adapted for piercing skin and sucking blood. Fleas are external parasites, living by hematophagy off the blood of mammals (including humans). Some species include the cat flea (*Ctenocephalides felis*), dog flea (*Ctenocephalides canis*), and human flea (*Pulex irritans*).

Fleas are small (1.5 to 3.3 mm) long, agile, dark-colored, wingless insect with tube-like mouth parts adapted to feeding on the blood of their hosts. Their legs are long, with the hind pair well adapted for jumping. A flea can jump vertically up to seven inches and horizontally up to 13 inches. The flea body is hard, polished, and covered with many hairs and short spines directed backwards which assists its movement on the host. The body is able to withstand great pressure. Hard squeezing between the fingers is not normally sufficient to kill a flea.

Fleas lay tiny white oval-shaped eggs. The larva is small, pale, has bristles covering its worm-like body, lacks eyes, and has mouthparts adapted to chewing.

Fleas can cause medical problems include flea allergy dermatitis, secondary skin irritations and, in extreme cases, anemia, tapeworms, and stomach flu. Fleas can transmit murine typhus (endemic typhus) fever among animals and from animal to humans. Fleas can also transmit bubonic plague. Tapeworms normally infest in human severe cases. Although the bite is rarely felt, it is the resulting irritation caused by the flea salivary secretions that varies among individuals. Some result in a severe reaction including a general rash or inflammation resulting in secondary infections caused by scratching the irritated skin. Most bites are found on the feet and legs with the formation of small, hard, red, slightly raised itching spots with a single puncture point in the center of each spot.

## **Treatment**

Flea bites can be treated with anti-itch creams, usually antihistamines or hydrocortisone.

## **Bed Bugs**

Bed bugs are small parasitic insects that feed on human blood. A number of health effects may occur due to bed bugs including skin rashes, prominent blisters, psychological effects and allergic symptoms. Diagnosis involves finding the bed bugs and the occurrence of compatible symptoms. Treatment is otherwise symptomatic.

Adult bed bugs are reddish-brown, flattened, oval and wingless. Bed bugs have microscopic hairs that give them a banded appearance. Adults grow to 4-5mm in length and 1.5-3 mm wide. A bed bug pierces the skin of its host with two hollow feeding tubes shaped like tongues. The one tube injects its saliva, which contains anticoagulants and anesthetics, while the other draws blood of its host. After feeding for approximately five minutes, the bug returns to its hiding place. Although bed bugs can live for a year without feeding, they normally feed every five to ten days.

Eradication of bed bugs frequently requires a combination of pesticide and non-pesticide approaches. Pyrethroids, dichlorvos, and malathion have historically been effective. Mechanical approaches include vacuuming and heat treating or wrapping mattresses have also been recommended.



**ATTACHMENT 1**  
**RICKETTSIAL INFECTIONS**

## **Rickettsial Infections**

### **Description**

Many species of *Rickettsia* can cause illnesses in humans (Table below). The term "rickettsiae" conventionally embraces a polyphyletic group of microorganisms in the class Proteobacteria, comprising species belonging to the genera *Rickettsia*, *Ehrlichia*, *Coxiella*, and *Bartonella*. These agents are usually not transmissible directly from person to person except by blood transfusion or organ transplantation, although sexual and placental transmission has been proposed for *Coxiella*. Transmission generally occurs via an infected arthropod vector or through exposure to an infected animal reservoir host. However, sennetsu fever is acquired following consumption of raw fish products. The clinical severity and duration of illnesses associated with different rickettsial infections vary considerably, even within a given antigenic group. Rickettsioses range in severity from diseases that are usually relatively mild (cat scratch disease) to those that can be life-threatening (murine typhus) and they vary in duration from those that can be self-limiting to chronic (Q fever and bartonellosis) or recrudescent (Brill-Zinsser disease). Most patients with rickettsial infections recover with timely use of appropriate antibiotic therapy.

Travelers may be at risk for exposure to agents of rickettsial diseases if they engage in occupational or recreational activities which bring them into contact with habitats that support the vectors or animal reservoir species associated with these pathogens.

The geographic distribution and the risks for exposure to rickettsial agents are described below and in the Table below.

### **Trench Fever**

Trench fever, which is caused by *Bartonella quintana*, is transmitted from one person to another by the human body louse. Contemporary outbreaks of both diseases are rare in most developed countries and generally occur only in communities and populations in which body louse infestations are frequent, especially during the colder months when louse-infested clothing is not laundered. Foci of trench fever have also been recognized among homeless populations in urban centers of industrialized countries. Travelers who are not at risk of exposure to body lice or to persons with lice are unlikely to acquire these illnesses. However, health-care workers who care for these patients may be at risk for acquiring louse-borne illnesses through inhalation or inoculation of infectious louse feces into the skin or conjunctiva.

## Murine Typhus

Murine typhus, which is caused by infection with *Rickettsia typhi*, is transmitted to humans by rat fleas, particularly during exposure in rat-infested buildings (3). Flea-infested rats can be found throughout the year in humid tropical environments, especially in harbor or riverine environments. In temperate regions, they are most common during the warm summer months.

Travelers who participate in outdoor activities in grassy or wooded areas (e.g., trekking, camping, or going on safari) may be at risk for acquiring tick-borne illnesses, including those caused by *Rickettsia*, and *Ehrlichia* species (see below).

**TABLE Epidemiologic features and symptoms of rickettsial diseases**

ANTIGENIC GROUP	DISEASE	AGENT	PREDOMINANT SYMPTOMS	VECTOR OR ACQUISITION MECHANISM	ANIMAL RESERVOIR	GEOGRAPHIC DISTRIBUTION OUTSIDE THE US
Typhus fevers	Murine typhus	<i>R. typhi</i>	As above, generally less severe	Rat flea	Rats, mice	Worldwide
Spotted fevers						
Coxiella	Q fever	<i>Coxiella burnetii</i>	Fever, headache, chills, sweating, pneumonia, hepatitis, endocarditis	Most human infections are acquired by inhalation of infectious aerosols, tick	Goats, sheep, cattle, domestic cats, other	Worldwide
Bartonella	Cat-scratch disease	<i>Bartonella henselae</i>	Fever, adenopathy, neuroretinitis, encephalitis	Cat flea	Domestic cats	Worldwide
	Trench fever	<i>B. quintana</i>	Fever, headache, pain in shins, splenomegaly, disseminated rash	Human body louse	Humans	Worldwide
Ehrlichia	Ehrlichiosis	<i>Ehrlichia chaffeensis</i> <sup>#</sup>	Fever, headache, nausea, occasionally rash	Tick	Various large and small mammals, including deer and rodents	Worldwide

This represents only a partial list of symptoms. Patients may have different symptoms or only a few of those listed.

## Anaplasmosis and Ehrlichiosis

Human ehrlichiosis and anaplasmosis are acute tick-borne diseases, associated with the lone star tick, *Amblyomma americanum*, and *Ixodes* ticks, respectively. Because one tick may be infected with more than one tick-borne pathogen (e.g. *Borrelia burgdorferi*, the causative agent of Lyme disease, or various *Babesia* species, agent of human babesiosis), patients may be present with

atypical clinical symptoms that complicate treatment. Ehrlichioses and anaplasmosis are characterized by infection of different types of leukocytes, where the causative agent multiplies in cytoplasmic membrane-bound vacuole called morulae. Morulae can sometimes be detected in Giemsa-stained blood smears.

## **Q FEVER**

Q fever occurs worldwide, most often in persons who have contact with infected goat, sheep, cat and cattle, particularly parturient animals (especially farmers, veterinarians, butchers, meat packers, and seasonal workers). Travelers who visit farms or rural communities can be exposed to *Coxiella burnetii*, the agent of Q fever, through airborne transmission (via animal-contaminated soil and dust) or less commonly through consumption of unpasteurized milk products or by exposure to infected ticks. These infections may initially result in only mild and self-limiting influenza-like illnesses, but if untreated, infections may become chronic, particularly in persons with preexisting heart valve abnormalities or with prosthetic valves. Such persons can develop chronic and potentially fatal endocarditis.

## **Cat-Scratch Disease**

Cat-scratch disease is contracted through scratches and bites from domestic cats, particularly kittens, infected with *Bartonella henselae*, and possibly from their fleas (3, 4). Exposure can therefore occur wherever cats are found.

## **Symptoms**

Clinical presentations of rickettsial illnesses vary (Table above), but common early symptoms, including fever, headache, and malaise, are generally nonspecific. Illnesses resulting from infection with rickettsial agents may go unrecognized or are attributed to other causes. Atypical presentations are common and may be expected with poorly characterized non-indigenous agents, so appropriate samples for examination by specialized reference laboratories should be obtained. A diagnosis of rickettsial diseases is based on two or more of the following: 1) clinical symptoms and an epidemiologic history compatible with a rickettsial disease, 2) the development of specific convalescent-phase antibodies reactive with a given pathogen or antigenic group, 3) a positive polymerase chain reaction test result, 4) specific immunohistologic detection of rickettsial agent, or 5) isolation of a rickettsial agent. Ascertaining the likely place and the nature of potential exposures is particularly helpful for accurate diagnostic testing.

## **Prevention**

With the exception of the louse-borne diseases described above, for which contact with infectious arthropod feces is the primary mode of transmission (through autoinoculation into a wound, conjunctiva, or inhalation), travelers and health-care providers are generally not at risk for becoming infected via exposure to an ill person. Limiting exposures to vectors or animal reservoirs remains the best means for reducing the risk for disease. Travelers and persons working in areas where organisms may be present should implement prevention based on avoidance of vector-infested habitats, use of repellents and protective clothing, prompt detection and removal of arthropods from clothing and skin, and attention to hygiene.

Q fever and *Bartonella* group diseases may pose a special risk for persons with abnormal or prosthetic heart valves, and *Rickettsia*, *Ehrlichia*, and *Bartonella* for persons who are immunocompromised.

## **ATTACHMENT 2**

### **ENCEPHALITIS ARBOVIRAL ENCEPHALITIDES**



## Encephalitis Arboviral Encephalitides

### Perspectives

Arthropod-borne viruses, i.e., arboviruses, are viruses that are maintained in nature through biological transmission between susceptible vertebrate hosts by blood feeding arthropods (mosquitoes, psychodids, ceratopogonids, and ticks). Vertebrate infection occurs when the infected arthropod takes a blood meal. The term 'arbovirus' has no taxonomic significance. Arboviruses that cause human encephalitis are members of three virus families: the *Togaviridae* (genus *Alphavirus*, *Flaviviridae*, and *Bunyaviridae*).

All arboviral encephalitides are zoonotic, being maintained in complex life cycles involving a nonhuman primary vertebrate host and a primary arthropod vector. These cycles usually remain undetected until humans encroach on a natural focus, or the virus escapes this focus via a secondary vector or vertebrate host as the result of some ecologic change. Humans and domestic animals can develop clinical illness but usually are "dead-end" hosts because they do not produce significant viremia, and do not contribute to the transmission cycle. Many arboviruses that cause encephalitis have a variety of different vertebrate hosts and some are transmitted by more than one vector. Maintenance of the viruses in nature may be facilitated by vertical transmission (e.g., the virus is transmitted from the female through the eggs to the offspring).

Arboviral encephalitides have a global distribution which is transmitted by mosquitoes. Powassan, is a minor cause of encephalitis in the northern United States, and is transmitted by ticks. A new Powassan-like virus has recently been isolated from deer ticks. Its relatedness to Powassan virus and its ability to cause disease has not been well documented. Most cases of arboviral encephalitis occur from June through September, when arthropods are most active. In milder (i.e., warmer) parts of the country, where arthropods are active late into the year, cases can occur into the winter months.

The majority of human infections is asymptomatic or may result in a nonspecific flu-like syndrome. Onset may be insidious or sudden with fever, headache, myalgias, malaise and occasionally prostration. Infection may, however, lead to encephalitis, with a fatal outcome or permanent neurologic sequelae. Fortunately, only a small proportion of infected persons progress to frank encephalitis.

Experimental studies have shown that invasion of the central nervous system (CNS), generally follows initial virus replication in various peripheral sites and a period of viremia. Viral transfer from the blood to the CNS through the olfactory tract has been suggested. Because the arboviral encephalitides are viral diseases, antibiotics are not effective for treatment and no effective antiviral drugs have yet been discovered.

## **Prevention**

Arboviral encephalitis can be prevented in two major ways: personal protective measures and public health measures to reduce the population of infected mosquitoes. Personal measures include reducing time outdoors particularly in early evening hours, wearing long pants and long sleeved shirts and applying mosquito repellent to exposed skin areas. Public health measures often require spraying of insecticides to kill juvenile (larvae) and adult mosquitoes.

Selection of mosquito control methods depends on what needs to be achieved; but, in most emergency situations, the preferred method to achieve maximum results over a wide area is aerial spraying. In many states aerial spraying may be available in certain locations as a means to control nuisance mosquitoes. Such resources can be redirected to areas of virus activity. When aerial spraying is not routinely used, such services are usually contracted for a given time period. Financing of aerial spraying costs during large outbreaks is usually provided by state emergency contingency funds. Federal funding of emergency spraying is rare and almost always requires a federal disaster declaration. Such disaster declarations usually occur when the vector-borne disease has the potential to infect large numbers of people, when a large population is at risk and when the area requiring treatment is extensive. Special large planes maintained by the United States Air Force can be called upon to deliver the insecticide(s) chosen for such emergencies. Federal disaster declarations have relied heavily on risk assessment by the CDC.

There are no commercially available human vaccines for these U.S. diseases.

### **Powassan Encephalitis**

Powassan (POW) virus is a flavivirus and currently the only well documented tick-borne transmitted arbovirus occurring in the United States and Canada. Recently a Powassan-like virus was isolated from the deer tick, *Ixodes scapularis*. Its relationship to POW and its ability to cause human disease has not been fully elucidated. POW's range in the United States is primarily in the upper tier States. In addition to isolations from man, the virus has been recovered from ticks (*Ixodes marxi*, *I. cookei* and *Dermacentor andersoni*) and from the tissues of a skunk (*Spilogale putorius*). It is a rare cause of acute viral encephalitis. POW virus was first isolated from the brain of a 5-year-old child who died in Ontario in 1958. Patients who recover may have residual neurological problems.

### **Other Arboviral Encephalitides**

Many other arboviral encephalitides occur throughout the world. Most of these diseases are problems only for those individuals traveling to countries where the viruses are endemic.

### **West Nile Encephalitis**

Discussed elsewhere in this document

## FLD 43 D HAZARDOUS PLANTS

A number of hazardous plants may be encountered during field operations. The ailments associated with these plants range from mild hay fever to contact dermatitis. Plants that present the greatest risk to site workers are those that produce allergic reactions and tissue injury.

### Plants That Cause Skin and Tissue Injury

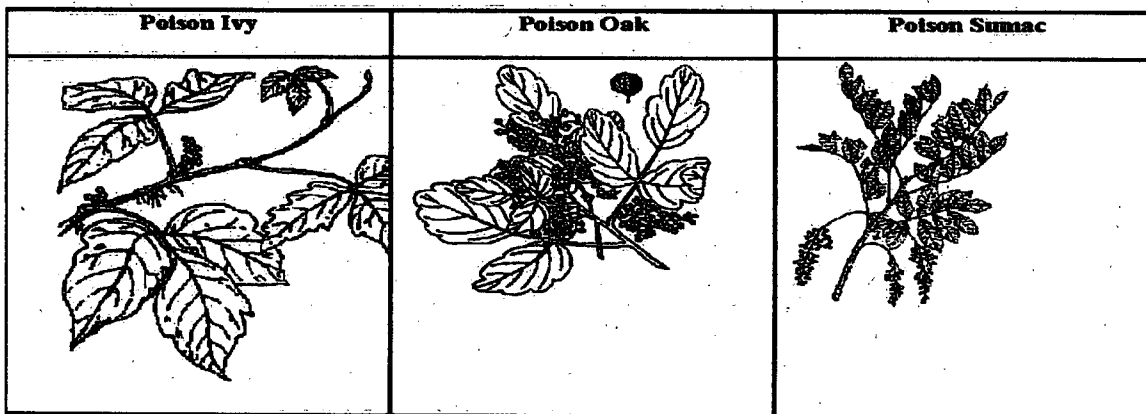
Contact with sharp leaves and thorns are of special concern to site personnel. This concern stems from the fact that punctures, cuts, and even minor scrapes caused by accidental contact may result in skin lesions and the introduction of fungi or bacteria through the skin. This is especially important in light of the fact that the warm moist environment created inside protective clothing is ideal for the propagation of fungal and bacterial infection. Personnel receiving any of the injuries listed above, even minor scrapes shall report immediately for continued observation and care. Keeping the skin covered as much as possible (i.e., long pants and long sleeved shirts) in areas where these plants are known to exist will limit much of the potential exposure.

### Plants That Cause an Allergic Reaction

The poisonous plants of greatest concern are poison ivy, poison oak, and poison sumac. Contact with the poisonous sap of these plants produces a severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim also may develop a high fever and may be very ill. Ordinarily, the rash begins within a few hours after exposure, but it may be delayed for 24 to 48 hours.

The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each. In certain seasons, both plants also have greenish-white flowers and berries that grow in clusters. Poison sumac is a tall shrub or small tree with 6 to 12 leaflets arranged in pairs with a single leaflet at the end. This plant grows in wooded, swampy areas.

#### Poison Ivy/Poison Oak/Poison Sumac



The reaction associated with exposure to these plants will generally cause the following signs and symptoms:

- Blistering at the site of contact, usually occurring within 12 to 48 hours after contact
- Reddening, swelling, itching and burning at the site of contact
- Pain, if the reaction is severe
- Conjunctivitis, asthma, and other allergic reactions if the person is extremely sensitive to the poisonous plant toxin

If the rash is scratched, secondary infections can occur. Preventive measures that are effective for most site personnel include:

- Avoid contact with any poisonous plants on site, and keep a steady watch to identify, report and mark poisonous plants found on site
- Wash hands, face or other exposed areas at the beginning of each break period and at the end of each workday
- Avoid contact with, and wash on a daily basis, contaminated tools, equipment and clothing
- Barrier creams, detoxification/wash solutions and orally administered desensitization may prove effective and should be tried to find the best preventive solution

Keeping the skin covered as much as possible (i.e., long pants and long sleeved shirts) in areas where these plants are known to exist will limit much of the potential exposure.

### **Plants That are Poisonous**

There are a number of plants worldwide beside poison ivy, oak and sumac which have poisonous properties. In many cases consumption of these plants or parts of these plants can result in poisoning. In other cases, contact with the plants may be poisonous. The following is a listing with pertinent information on poisonous properties and locations of a number of plants.

In general, when working in the outdoors or where you may come in contact with household plants or where your families may come in contact with these plants, it is important that as soon as possible after contact the area or areas should be thoroughly washed and hands must be thoroughly washed before eating drinking, smoking or any other hand to mouth contact.

In keeping with our 24/7 BBS concept, it is important to remember that children are particularly vulnerable to many of the poisonous parts of these plants. Many of these poisonous parts resemble non-poisonous food items such as berries and are attractive.

As with most lists there is extensive information but the list may not include all poisonous plants.

It is important to remember that this document is a starting point to be supplemented with local information. The majority of this information is from a list found in Wikipedia an on line Dictionary readily accessible via Google. The website has pictures of these plants as well as links to other information sources.

## POISONOUS PLANTS

From Wikipedia,

This is a list of plants containing poisonous parts that pose a serious risk of illness, injury, or death to humans.

### Poisonous Food Plants

- **Apple (*Malus domestica*) Found worldwide in cooler climates.** Seeds contain cyanogenic glycosides; although the amount found in most apples won't kill a person.
- **Cherry (*Prunus cerasus*), as well as other species (*Prunus spp*) such as peach (*Prunus persica*), plum (*Prunus domestica*), almond (*Prunus dulcis*) and apricot (*Prunus armeninaca*).** There are around 430 species of *Prunus*, spread throughout the northern temperate regions of the globe. Leaves and seeds contain cyanogenic glycosides
- **Rhubarb (*Rheum rhaponticum*) Found worldwide.** Leaves, but not stems, contain oxalic acid salts, causing kidney disorders, convulsions, and coma. Rarely fatal.
- **Tomato (*Solanum lycopersicum*) Found worldwide.** Foliage and vines contain alkaloid poisons which cause digestive upset and nervous excitement.

### Other Poisonous Plants

- **Autumn crocus. Found in North America.** The bulbs are poisonous and cause nausea, vomiting, diarrhea. Can be fatal.
- **Azalea Found Worldwide.** All parts of the plant are poisonous and cause nausea, vomiting, depression, breathing difficulties, and coma. Rarely fatal.
- **Bittersweet nightshade Naturalized in North America.** All parts are poisonous, containing solanine and causing fatigue, paralysis, convulsions and diarrhea. Rarely fatal.
- **Bleeding heart / Dutchman's breeches. Found in North America.** Leaves and roots are poisonous and cause convulsions and other nervous symptoms.
- **Black locust. Naturalized in North America.** Pods are toxic
- **Caladium / Elephant ear. Ornamental plants in North America.** All parts of the plant are poisonous. Symptoms are generally irritation, pain, and swelling of tissues. If the mouth or tongue swells, breathing may be fatally blocked.

- **Castor Oil Plant (*Ricinus communis*)** Castor Oil Plant. **Found Worldwide.** The phytotoxin is **ricin**, an extremely toxic water soluble protein, which is concentrated in the seed. Also present are ricinine, an alkaloid, and an irritant oil. Causes burning in mouth and throat, convulsions, and is **often fatal**.
- **Daffodil. Found worldwide.** The bulbs are poisonous and cause nausea, vomiting, and diarrhea. **Can be fatal**.
- **Daphne (*Daphne sp.*)** **Ornamental plant worldwide.** The berries (either red or yellow) are poisonous, causing burns to mouth and digestive tract, followed by coma. **Often fatal**.
- **Darnel/Poison Ryegrass (*Lolium temulentum*)** **Usually grows in the same production zones as wheat and is considered a weed.** The seeds and seed heads of this common garden weed may contain the alkaloids temuline and loline. Some experts also point to the fungus ergot or fungi of the genus endoconidium both of which grow on the seed heads of rye grasses as an additional source of toxicity.
- **Deadly nightshade (*Atropa belladonna*)** **Naturalized in parts of North America.** All parts of the plant contain the toxic alkaloid atropine. The young plants and seeds are especially poisonous, causing nausea, muscle twitches, paralysis; **often fatal**.
- **Dumbcane / dieffenbachia. Found in tropical areas and popular as house plants.** All parts are poisonous, causing intense burning, irritation, and immobility of the tongue, mouth, and throat. Swelling can be severe enough to block breathing leading to death.
- **Ivy. Native to North America** where winters are not severe. The leaves and berries are poisonous, causing stomach pains, labored breathing, possible coma.
- **Jerusalem cherry United States** All parts, especially the berries, are poisonous, causing nausea and vomiting. **Looks like a cherry tomato.** It is occasionally fatal, especially to children.
- **Lilies Worldwide** There are some 3500 species that comprise the lily (Lilaceae) family. Some are beneficial including (foods such as onion, shallot, garlic, chives [all *Allium* spp] and asparagus) and some with medicinal uses (colchicine and red squill) Many produce alkalids which are poisonous, especially to cats.
- **Manchineel (*Hippomane mancinella*)** **Native to the Caribbean (including Puerto Rico and the Virgin Islands).** It is one of the most poisonous trees in the world All parts of this tree including the fruit contain toxic phorbol esters typical of the Euphorbiaceae. Sap may cause burning of the skin and smoke from burning may cause eye irritation and blindness. Fruits, which are similar in appearance to an apple, are green or greenish-yellow when ripe.
- **Oak Worldwide** Most species foliage and acorns are mildly poisonous, causing digestive upset, heart trouble, contact dermatitis. **Rarely fatal**.

- **Poison-ivy (*Toxicodendron radicans*), Poison-oak (*T. diversilobum*), and Poison Sumac (*T. vernix*) North America** All parts of these plants contain a highly irritating oil with urushiol (this is actually not a poison but an allergen). Skin reactions can include blisters and rashes. It spreads readily to clothes and back again, and has a very long life. Infections can follow scratching.
- **Pokeweed (*Phytolacca sp.*) Native to North America.** Leaves, berries and roots contain phytolaccatoxin and phytolaccigenin - toxin in young leaves is reduced with each boiling and draining.



## **FLD 49 SAFE STORAGE OF SAMPLES**

### **REFERENCE**

DOT Emergency Response Guide (ERG)

To ensure that multi-media samples collected in the course of WESTON work assignments are not stored in a manner that creates undue hazard to WESTON employees or others.

### **PROCEDURE**

Samples that are transported from a WESTON work location must be classified and packaged in compliance with U.S. Department of Transportation (DOT) regulations or alternatively in accordance with International Air Transport Association (IATA) regulations. WESTON's manual of Procedures for Shipping and Transporting Dangerous Goods must be consulted to determine if the samples will be classified as either "environmental" or "hazardous materials" samples.

#### **Environmental Samples**

Environmental samples are not subject to DOT or IATA dangerous goods regulations and must be packaged to protect their integrity during transportation and temporary storage and should have appropriate chain-of-custody documentation. These samples may be brought to a WESTON office location or rented space to verify sample documentation and repackaging (e.g., with ice or cold packs). Minor spill clean-up capability is required.

Once secured for shipment, these samples can be temporarily stored for the next day ground or air shipment pick-up. Under no circumstances are samples to be stored beyond the time necessary to arrange for transportation to a laboratory.

#### **Hazardous Materials Samples**

These samples are subject to DOT and/or IATA dangerous goods regulations and must be packaged and labeled according to the appropriate regulations, including completed chain-of-custody documentation prior to being transported from the WESTON work site. WESTON drivers must have the documentation for the samples and a DOT Emergency Response Guide (ERG) readily available in the vehicle. The ERG is available on-line at: <http://hazmat.dot.gov/pubs/erg/guidebook.htm> and appropriate sections can be copied to accompany samples being transported by vehicles driven by WESTON employees.

Under normal circumstances these samples should be shipped from the field and never brought back to a WESTON office location or into a rented space. If it is not possible to ship the samples from the field during the same day they are collected, a properly packaged, labeled, and sealed sample shipping container may be brought back to a WESTON office location for shipment to a laboratory the next business day - provided the temporary storage location is secure from access by any personnel who are not trained in shipping hazardous materials. Under no circumstances are samples to be stored in rented space; if necessary, secure temporary storage in a locked vehicle may be authorized. Note that some office leases do not permit the storage of hazardous materials and the lease will govern whether such materials can be stored overnight.

## **INSPECTION FOLLOW-UP**

Shipping procedures for samples should be included in the site-specific health and safety plan (HASP) and reviewed for compliance with these procedures prior to approval. EHS audits will include a review to sample shipping and storage procedures.

## **FLD 58 DRUM HANDLING OPERATIONS**

### **REFERENCES**

29 CFR 1910.120 and 29 CFR 1926.65 – Occupational Safety and Health Administration (OSHA)  
40 CFR Parts 264, 265 and 311 – U.S. Environmental Protection Agency (EPA)  
49 CFR Parts 171 through 178 – U.S. Department of Transportation (DOT)  
USACE EM 385-1-1 – U.S. Army Corps of Engineers

### **RELATED FLDs**

*FLD 08 – Confined Space Entry Program*

*FLD 40 – Storage Tank Removal and Decommissioning*

One of the most hazardous operations to be conducted at any hazardous waste site is the handling of drums and other containers. Container contents cannot be relied upon to be the same as existing markings. Extreme caution is necessary for the safety of site workers, the public and the environment.

Accidents have occurred during the handling of drums and other containers. Hazards associated with drum or other container handling include; fires, explosions, vapor releases, spills and injuries from lifting or other physical hazards associated with moving containers. In order to increase employee safety when container movement or handling is anticipated, strict guidelines that limit the numbers of personnel exposed to drum/container handling hazards are necessary.

This FLD identifies generic safety guidance for those activities involving drum handling at hazardous waste operations. Site-specific criteria must be included in any health and safety plan (HASP) to anticipate potential hazards associated with drum handling task.

Various standards are in effect for the movement and handling of drums and other containers. Site-specific HASPs must anticipate and follow the standards referenced as related to site activities.

### **GENERAL**

Hazardous substances, contaminated liquids, and other residues will be handled, transported, labeled, and disposed of in accordance with this FLD and applicable regulatory standards.

Drums and containers used during remediation activities must meet the appropriate DOT, OSHA, and EPA regulations for the wastes or materials that they contain.

When practical, drums and containers are to be inspected and their integrity ensured prior to being moved. Drums or containers that cannot be inspected before being moved because of storage conditions (e.g., buried beneath the earth, stacked behind other drums, stacked several tiers high in a pile) will be moved to an accessible location and inspected prior to further handling.

Unlabeled drums and containers will be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.

Site operations must be organized to minimize the amount of drum or container movement.

Fire extinguishing equipment will be on hand and ready for use to control incipient fires.

Level B protective equipment must be used as a minimum unless available evidence/research indicates that a lower level of protection is safe or a higher level of protection is necessary.

#### **Locating and Inspecting Drums/Containers - Minimal Criteria**

Review background data and site history to determine types and location of containers either known or suspect.

Conduct geophysical surveys utilizing devices such as, ground-penetrating system or other type of detection system or device to estimate the location and depth of buried drums or containers.

Monitor the site utilizing appropriate direct-reading instrumentation to verify the presence of potential volatile materials.

For visible containers, approach containers cautiously and in appropriate levels of protection based upon available evidence. Continue air monitoring with direct-reading instruments following appropriate action levels.

Visually determine container integrity and observe for signs of current or historic leakage.

#### **Container Movement and Handling - Minimal Criteria**

Implement a spill containment plan prior to any container movement. This plan must include, at a minimum, provisions for appropriate types and numbers of over-pack containers, absorbent, tools and other emergency equipment determined to be necessary. Personnel must be instructed in procedures to follow in the event of a spill.

Monitor containers utilizing the appropriate direct-reading instruments for each container to verify potential leakage and employee exposure to contents.

Perform excavation activities carefully to avoid the possibility of rupturing any containers. Excavation activities must be in compliance with 29 CFR 1926 Subpart P (Excavations).

Prior to movement of drums or containers, brief all employees exposed to the transfer operation on the potential hazards associated with the contents of the drums or containers.

Empty all drums and containers that cannot be moved without rupture, leaking, or spills. Drums or containers will be emptied into a sound container using a device classified for the material being transferred.

Move and handle containers preferably using a drum grapppler. Other means of handling must be justified in the HASP. Movement by hand is to be offered as a last resort.

Overpack damaged containers or those with suspect integrity or transfer contents to appropriate containers prior to movement (if safe to do so). Proper assessment of contents must be made prior to transfer. Proper grounding and bonding techniques must be followed.

Use blast shields on excavation and container handling equipment unless the hazard and risk assessment indicates it is safe to perform the operation without blast shields.

If drums are to be moved utilizing drum slings, yokes, or other accessories, ensure that workers move away from the area after affixing the accessory and prior to drum movement by the equipment operator.

Do not move critically swollen containers by hand. Pressure is to be safely relieved prior to movement unless movement is by grapples and properly protected equipment operator.

Remotely handle containers suspected of containing explosive or reactive materials.

#### **Drum Staging, Opening, and Sampling - Minimal Criteria**

Identify staging areas prior to container movement. Based upon the perceived risk from container contents, the staging area must be remote from other site activities.

Ensure that minimal and appropriate equipment (e.g., fire protection, spill control and containment, PPE) is available at the staging area.

Stage compressed gas cylinders in a shaded area.

Remotely handle potentially reactive, explosive, or shock-sensitive containers and stage them separate from other containers.

Stage containers to allow ease in sampling, appropriate aisle space and the avoidance of cross-contamination or reaction during opening activities.

Ensure that employees do not stand upon or work from drums or containers.

Open all drums and containers in such a manner that excess interior pressure will be safely relieved. If pressure cannot be relieved from a remote location, ensure that appropriate shielding is placed between the employee and the drums or containers to reduce the risk of injury.

Ensure that material handling equipment used to transfer drums and containers is selected, positioned and operated to minimize the potential for sources of ignition related to the equipment from igniting vapors released from ruptured drums or containers.

Do not handle drums and containers containing radioactive wastes until appropriate clearance is obtained in writing from the Corporate Radiation Safety Officer, Corporate Health and Safety Director, or designee.

Use only spark-proof tools in drum opening operations.

Perform sampling of containers and drums in accordance with a sampling plan prepared as a part of the site-specific HASP.

As a minimum, take the following special precautions when handling drums and containers containing or suspected of containing shock-sensitive wastes:

- All non essential employees will be evacuated from the area of transfer.
- Material handling equipment will be provided with explosive containment devices or protective shields to protect equipment operators from the potential of exploding containers.

- An employee alarm system capable of being heard or seen above surrounding light and noise conditions will be used to signal the commencement and completion of explosive waste handling activities.
- Continuous communications (i.e., portable radios, hand signals, telephones, as appropriate) will be maintained between the employee in charge of the immediate handling area and both the field safety officer and the command post until such time as the handling operation is completed.
- Communication equipment or methods that could cause shock sensitive materials to explode will not be used.
- Drums and containers under pressure, as evidenced by bulging or swelling, will not be moved until such time as the cause for excess pressure is determined and appropriate containment procedures have been implemented to protect employees from explosive relief of the drum.
- Drums and containers containing packaged laboratory wastes will be considered to contain shock sensitive or explosive materials until they have been characterized.

### **Laboratory Waste Packs (Lab Packs)**

In addition to the requirements outlined for shock sensitive wastes, the following precautions will be taken at a minimum when handling laboratory waste packs (lab packs):

- Lab packs will be opened only when necessary and then only by an individual knowledgeable in the inspection, classification, and segregation of the containers within the pack according to the hazards of the wastes.
- If crystalline material is noted on any container, the contents will be handled as a shock sensitive waste until the contents are identified.
- Remote opening of Lab Pack containers is the preferred technique.
- Manual opening lab packs must be approved in the HASP based upon appropriate hazard analysis.

### **Consolidation and Re-containerization - Minimal Criteria**

Segregate containers based upon on-site compatibility testing.

Promptly clean up any spillage to preclude inadvertent reactions or cross-contamination.

Perform bulking of materials only after appropriate compatibility testing.

Ensure that drums and other repackaging containers meet DOT criteria for the hazard class of the material.

### **Interim Storage and Transportation - Minimal Criteria**

Ensure that Interim Storage areas are in compliance with EPA standards for container storage.

Inspect storage areas weekly, at a minimum. The criteria outlined in 40 CFR Part 265 will be utilized as guidance.

Ensure that adequate aisle space is maintained for worker protection in the storage area.

Ensure that containers are protected (as necessary) from adverse weather conditions. Containers of compressed gasses or reactive or explosive materials should be protected from environmental conditions by covers or shades.

Ensure that fire extinguishers and eye wash stations are available near the storage area.

Ensure that adequate spill control equipment is available near the storage area.

Transport containers according to appropriate USDOT and USEPA regulations.

#### **Tank and Vault Procedures**

Tanks and vaults containing hazardous substances must be handled in a manner similar to that for drums and containers, taking into consideration the size of the tank or vault as well as FLD 40.

Appropriate tank or vault entry procedures must be in compliance with FLD 08, Confined Space Entry Program.



## Summary of Safety Precautions for Drum, Cylinder, and Unknown Container Handling

<b>ACTIVITY:</b> Locating Containers and Conducting Inventory	
<b>POTENTIAL SAFETY HAZARD:</b> Unknown location and contents of drums can lead to unsuspected hazards.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Carefully review background data pertaining to the location and types of wastes on-site.</li> <li>• Conduct visual to minimize the possibility of puncturing drums. A spotter should be utilized to identify drums during excavation activities.</li> <li>• During the random sampling of containers, which may be required for an inventory, spacing between containers should be adequate to allow for emergency evacuation if needed.</li> <li>• Use remotely operated, non-sparking tools for random sampling whenever possible.</li> <li>• Use direct-reading air monitoring equipment to detect hot spots where contamination may pose a risk to worker safety.</li> </ul>
<b>ACTIVITY:</b> Determining Container Integrity	
<b>POTENTIAL SAFETY HAZARD:</b> The process of visual inspections requires close contact with containers of unknown content.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Approach container cautiously. Conduct air monitoring to indicate levels of hazards that require withdrawal from the work area or use of additional safety equipment.</li> <li>• Any container that is critically swollen should not be approached without proper PPE. It should be isolated using a barricade until the pressure can be relieved remotely.</li> <li>• Use of the grappler or other remotely operated equipment can eliminate the need for determining container integrity prior to excavation, provided that rupture of the container will not result in fire or unacceptable environmental impact.</li> </ul>
<b>ACTIVITY:</b> Container Excavation and Handling	
<b>POTENTIAL SAFETY HAZARD:</b> Exposure to toxic/hazardous vapors; rupture of containers.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Where buried drums are suspected, conduct a visual survey before using any construction equipment in order to minimize the possibility of rupture. (If practical, a geophysical survey could be used prior to excavation.)</li> <li>• Use a container grappler where possible and cost-effective to minimize contact with containers. If a grappler is not available, pump or over pack drums of poor integrity before excavation.</li> <li>• Ground equipment prior to transferring wastes to new containers.</li> <li>• Use non-sparking hand tools and non-sparking bucket teeth on excavation equipment, and use Plexiglas shields on vehicle cabs.</li> <li>• Where slings, yokes, or other accessories must be used, workers should back away from the work area after attaching the accessory and before the container is lifted.</li> <li>• Critically swollen or bulging drums should not be handled until pressure can be relieved.</li> <li>• Use bars that fit over the teeth of excavation buckets to prevent container puncture.</li> <li>• Where ionizing levels of radiation are detected, the Field Safety Officer and Site Radiological Control Technician should be contacted and the work activity should stop.</li> <li>• Where explosive or shock-sensitive material is suspected, every effort should be made to handle the container remotely. Gas cylinders should not be dragged during handling.</li> <li>• Use direct-reading air monitoring equipment when in close proximity to containers to detect any hot spots.</li> </ul>

<b>ACTIVITY:</b> Container Staging and Opening	
<b>POTENTIAL SAFETY HAZARD:</b> Release of toxic, hazardous vapors, rupture of containers.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Stage gas cylinders in a cool, shaded area.</li> <li>• Stage potentially explosive or shock-sensitive wastes in a diked, fenced area.</li> <li>• Use remote container opening methods where containers are determined to be unsound.</li> <li>• Conduct remote-operated container opening form behind a barricade or behind a Plexiglas shield if backhoe-mounted puncture is being used.</li> <li>• Isolate container opening from staging and other activities if possible to prevent a chain reaction if an explosion or reaction does occur.</li> <li>• If container opening cannot be isolated from staging, containers should be staged so as to: (1) minimize the possibility of chain reactions in the event of a fire or explosion; and (2) provide adequate space for emergency evacuation.</li> <li>• Use only non-sparking hand tools if containers are to be opened manually.</li> <li>• Remotely relieve the pressure of critically swollen containers before opening.</li> <li>• Clean up spills promptly to minimize mixing of incompatible materials (Use the SPCCP for guidance.)</li> </ul>
<b>ACTIVITY:</b> Consolidation and Recontainerization	
<b>POTENTIAL SAFETY HAZARD:</b> Mixing of incompatible wastes.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Perform on-site compatibility or HAZCAT testing on all containers.</li> <li>• Segregate wastes according to compatibility class following compatibility testing.</li> <li>• Clean up spills promptly to avoid mixing or incompatible wastes.</li> <li>• Intentional mixing of incompatible wastes such as acids and bases should be performed under controlled conditions in a reaction tank where temperature and vapor release can be monitored.</li> <li>• Monitor for incompatible reactions during consolidation using direct-reading air monitoring equipment.</li> </ul>
<b>ACTIVITY:</b> Interim storage and transportation.	
<b>POTENTIAL SAFETY HAZARD:</b> Mixing of incompatible wastes.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Segregate incompatible wastes using dikes during interim storage.</li> <li>• Maintain a weekly inspection schedule.</li> <li>• Allow adequate aisle space between containers to allow rapid exit of workers in case of emergency.</li> <li>• Keep explosives and gas cylinders in a cool, shaded, or roofed area.</li> <li>• Prevent contact of water reactive wastes with water.</li> <li>• Clean up spills or leaks promptly.</li> <li>• Have fire fighting equipment readily available within the storage area.</li> <li>• Ensure adherence to DOT regulations regarding transport of incompatible wastes and container integrity.</li> </ul>